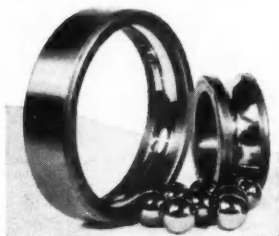


# AUTOMOTIVE INDUSTRIES

LAND — AIR — WATER

JULY 1, 1939

**WHY  
ANTI-FRICTION  
BEARINGS?**



**...and still going!**

In this New Departure ball bearing, which had made 35,000,000 revolutions under load, the original finish was perfect and Wear for all practical purposes was not measurable. Think what that kind of "wear prevention" means in lower maintenance and longer machine life!

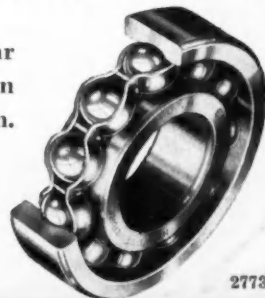


● Everyone knows this inevitable result of Wear due to friction. Yet... the sliding, scuffing contact of countless feet on granite is as nothing in wear potential compared to the contact of metal on metal—in modern machinery, under heavy loads, at high speeds.

During the useful life of an ever increasing number of modern machines, the bearings make millions or even billions of revolutions. And these machines stand up! For friction is practically eliminated in the ball bearing as perfected by New Departure, and Wear is less than in any other type of rolling bearing.

For interesting brochure, BT-20, "How Wear Wore Itself Out," write to New Departure Division General Motors Sales Corporation, Bristol, Conn.

**NEW DEPARTURE**  
**THE FORGED STEEL BEARING**



# STOPS VALVE STICKING ON COMPRESSOR

• VALVE CLEANING was a weekly job on the compressor in a central state foundry. The plant engineer had experienced with various oils but none relieved the trouble. When the Standard Lubrication salesman offered the services of a Lubrication Engineer, the plant engineer accepted, but he was practically convinced that nothing could be done.

The Standard Lubrication Engineer first analyzed a sample of the deposit on the valves. It proved to be a mixture of core sand, oil and asphalt. The compressor was flushed with a soap solution and the intercooler blown down. With the system thoroughly cleaned, Stanoil No. 25 was put into the lubricator. Much to the plant engineer's surprise, he has not had a sticking valve since then. The elimination of his former weekly valve repair bill more than pays the difference in cost of Stanoil.

It's almost certain that somewhere in your plant the higher quality of Stanoil will pay its way in reduced maintenance and lower ultimate lubricating costs. Let a Standard Lubrication Engineer point out some of these places. He'll make this analysis at no cost to you. Call him at the nearest Standard Oil (Ind.) office, or write 910 S. Michigan Ave., Chicago, Illinois.



Copy. 1939, Standard Oil Co. (Ind.)

# STANOIL

## STANDARD OIL COMPANY (INDIANA)

### LUBRICATION ENGINEERING

THE RIGHT LUBRICANT • PROPERLY APPLIED  
TO REDUCE COSTS



# AUTOMOTIVE INDUSTRIES

## AUTOMOBILE

Reg. U. S. Pat. Off.  
Published Semi-Monthly

Volume 81

Number 1

JULIAN CHASE, Directing Editor  
HERBERT HOSKING, Editor  
P. M. HELDT, Engineering Editor J. B. POLLOCK, Ass't Editor  
JOS. GESCHELIN, Detroit Technical Editor MARCUS AINSWORTH, Statistician  
J. A. LAANSMAN, Detroit News Editor HOWARD KOHLBRENNER, Art Editor  
JEROME H. FARRIS, Asst Editor L. W. MOFFETT, Washington Editor  
H. E. BLANK, JR., Asst Editor JAMES G. ELLIS, Washington Editor  
B. M. IKERT, Chicago Technical Editor

### CONTENTS

Russia Steps Up. By A. Beltsov .....	1
Business in Brief .....	3
The Weather Man takes a Hand. By Joseph Geschelin .....	4
Men and Machines .....	16
Mechanical Drawings of the Talbot-Darracq Four-Litre Master and Lago Special Engines .....	19
Just Among Ourselves .....	21
From France and England Come Engineering Data .....	22
Russian Production Illustrated .....	28
News of the Industry .....	29
Calendar of Coming Events .....	38
Advertisers' Index .....	86

Copyright 1939 by Chilton Company (Inc.)

C. A. MUSSELMAN, Pres.; J. S. HILDRETH, Vice-Pres. and Manager, Automotive Division; G. C. BUZBY, Vice-Pres.

#### OFFICES

Philadelphia—Chestnut & 56th Sts., Phone Sherwood 1424  
New York—239 W. 39th St., Phone Pennsylvania 6-1100. Chicago—Room 916, London Guarantee & Accident Bldg., Phone Franklin 4243. Detroit—1015 Stephenson Bldg., Phone Madison 2090. Cleveland—609 Guardian Bldg., Phone Cherry 4188. Washington—1061 National Press Bldg., Phone District 6877. San Francisco—444 Market St., Room 303, Phone Garfield 6788. Long Beach, Cal.—1595 Pacific Ave., Phone Long Beach 613-238.  
Cable Address ..... Autoland, Philadelphia

Member of the Audit Bureau of Circulations  
Member Associated Business Papers, Inc.

Automotive Industries—The Automobile is a consolidation of the Automobile (monthly) and the Motor Review (weekly), May, 1902; Dealer and Repairman (monthly), October, 1903, the Automobile Magazine (monthly), July, 1907, and the Horseless Age (weekly), founded in 1895, May, 1918.

Owned and Published by



**CHILTON COMPANY**  
(Incorporated)

Executive Offices  
Chestnut and 56th Streets, Philadelphia, Pa., U. S. A.

Officers and Directors

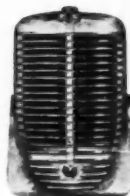
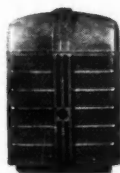
C. A. MUSSELMAN, President  
FRITZ J. FRANK, Executive Vice-President

FREDERIC C. STEVENS, JOSEPH S. HILDRETH, GEORGE H. GRIF-  
PITHS, EVERETT B. TERHUNE, Vice-Presidents; WILLIAM A. BARBER,  
Treasurer; JOHN BLAIR MOFFETT, Secretary; JOHN H. VAN DE-  
VENTER, JULIAN CHASE, THOMAS L. KANE, CHARLES S. BAUR,  
G. CARROLL BUZBY, P. M. FAHRENDORF.

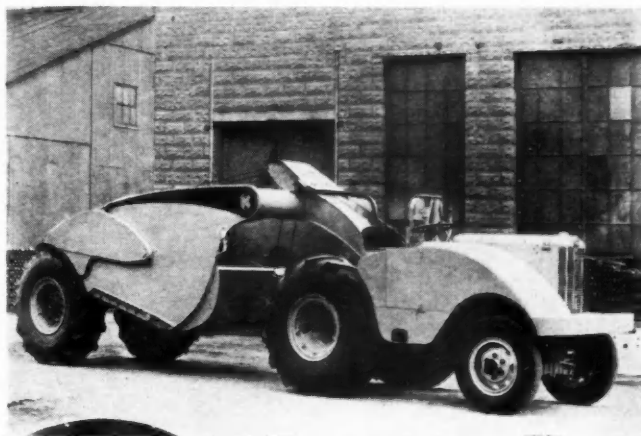
Streamlining

BY

# YOUNG



## HEAVY DUTY RADIATORS



Koehring Trail-Dump and Wheeler

The heavy duty automotive industrial field has adopted streamlining as a necessity to improve appearance and enhance sales appeal of its product.

In accomplishing this redesign, flowing lines must be carried out and still the inbuilt ruggedness and strength must be maintained in the unit to fit it to carry on under the extremely difficult operating conditions in which it is used.

The Koehring Co. of Milwaukee, Wisconsin, manufacturers of heavy duty construction equipment, like many other leaders in their respective industries, are using YOUNG Radiators as standard equipment because of this balance in fine appearance and efficient performance.

Place your particular problems with YOUNG Engineers for proper solution, both as to design and operation.

Write for Literature

## YOUNG RADIATOR COMPANY

RACINE, WISCONSIN, U. S. A.

ALSO MANUFACTURERS OF UNIT HEATERS - COPPER CONVECTORS - CONDENSERS -  
EVAPORATORS - AIR CONDITIONING UNITS - FAN BLAST COILS - EVAPORATIVE CON-  
DENSERS - EVAPORATIVE COOLERS - OIL COOLERS - GASOLINE, GAS, DIESEL, ENGINE  
COOLING RADIATORS - INTERCOOLERS - HEAT EXCHANGERS - HEATING, COOLING CORES  
- ENGINE JACKET WATER COOLERS - HEAT TRANSFER PRODUCTS

Automotive Industries

When writing to advertisers please mention Automotive Industries

July 1, 1939

AUTOMOTIVE INDUSTRIES, Vol. 81, No. 1. Published semi-monthly by Chilton Co., Chestnut & 56th Sts., Phila. Entered as Second-Class Matter October 1, 1925, at the Post Office at Philadelphia, Pa.; Under the Act of Congress of March 3, 1879. In Case of Non-Delivery Return Postage Guaranteed. Subscription price: United States, Mexico, United States Possessions, and all Latin-American countries, \$1.00 per year. Canadian and Foreign, \$2.00 per year; single copies, 25 cents, except Statistical Issue (Feb. 25, 1939), 50 cents.

*It's a*  
**LONG TIME**  
*between*  
**TOOL GRINDS**  
*with*  
**SUNOCO**  
 EMULSIFYING  
**CUTTING OIL**

Stop tools from turning soft...chipping...and burning—flood them with SUNOCO. Long service records prove SUNOCO prolongs tool life...reduces "down time" for resharpening...and steps up production per machine tool unit. If you're interested in downing "down time" call in a SUN Engineer—let him show you why it's a long time between tool grinds with SUNOCO.

**SUN OIL COMPANY • Philadelphia**



**PETROLEUM PRODUCTS FOR ALL INDUSTRIES**

July 1, 1939

When writing to advertisers please mention Automotive Industries

Automotive Industries



## Russia Steps Up

***production of trucks to first-place  
in European field and fourth-place  
for total output of motor vehicles.***

**U**LD Russia had no automotive industry of its own. In 1910 the assembly of automobiles from imported cars was undertaken by a machinery plant in Riga, but the output was . . . 460 cars in four years!

After the World and Civil wars the young Soviet Republic was left with fifteen to twenty thousand dilapidated cars, a negligible number, quite insufficient for the country's needs.

Development of the automotive industry on a large scale was undertaken during the years of the First Five-Year Plan as part of the country's huge industrialization program. The small shops of the AMO plant served as the basis for the construction of the large Stalin Auto Plant in Moscow for the manufacture of medium-sized trucks, which began operation on Oct. 1, 1931. At the same time a plant for construc-

tion of large trucks was erected and an auto plant for the production of trucks and passenger cars was built in Gorky. American firms helped in designing the Gorky plant as well as the vehicles it was to produce.

However, the building up of an automotive industry was not limited to the construction of these plants. There was also the problem of supplies of raw materials and various parts and accessories. So, simultaneously with the erection of auto plants, the Soviet Union also undertook the development of related branches of industry. Among these were a plant for the manufacture of ball bearings, the largest in Europe; standard parts and accessories plants; factories producing technical fabrics, tires, automobile glass and the like.

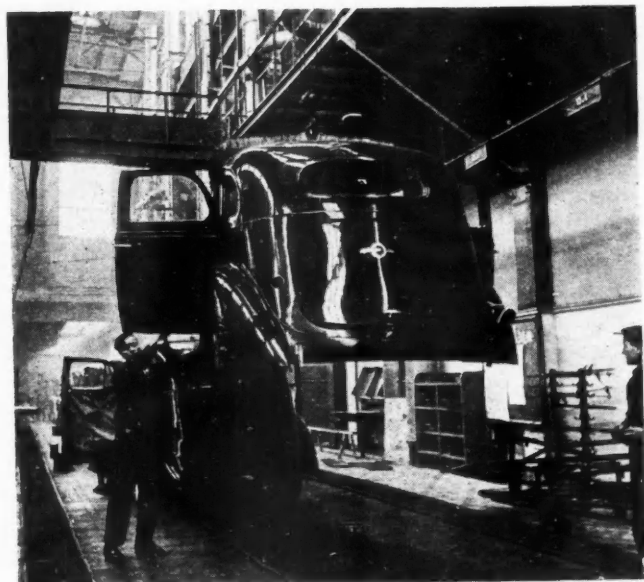
The Soviet automotive industry has the following organizational structure:

- (a) Plants supplying raw materials
- (b) Related branches of industry supplying finished parts
- (c) Specialized auxiliary plants
- (d) Main automobile plants
- (e) Assembly plants
- (f) Spare part manufacturers
- (g) Automobile repair shops and service stations.

The main raw material suppliers are metallurgical plants producing cast iron, high-grade alloy steels, aluminum and non-ferrous metals, some working exclusively for the automotive and tractor industries.

A large number of organizations in related branches of industry supply tubes and tires, glass, technical fabrics, varnishes and paints, lighting fittings, electrical equipment and a great variety of other finished products.

The specialized auxiliary plants are producing carburetor parts for the feeding system (sleeves, cocks, feed pipes, etc.), ball and roller bearings, small standard lighting fixtures (headlights, etc.), measuring in-



A "ZIS-101" body on the line at the Stalin plant in Moscow

struments (speedometers, ammeters, gas tank gages, etc.), hand tools, etc.

The main automobile plants manufacture only the most important parts of the car: the chassis, body, engine, gear boxes, front and rear axles, propeller shafts, wheels, etc.

The technological process in the auto plants runs as follows: iron and steel casting, forging, stamping and pressing, machining and assembly.

Automobiles are assembled on a conveyor which they leave under their own power. Engines are also assembled on a special conveyor.

In addition to the main auto plants, the assembly of automobiles is also carried on at special assembly plants.

To offer better service to auto vehicles there are special organizations which handle the production of spare parts and the repair of automobiles.

Parts for all types of automobiles are produced at plants which usually specialize in the manufacture of certain parts. There is, for example, a plant producing piston rings, one for piston rods, crankshafts, etc.

Overhauls and major repair of cars is handled by auto repair shops, while running repairs and service is provided by a network of service and repair stations.

Nearly 120 different enterprises take part in manufacturing and servicing Soviet automobiles.

Though established only in recent years, the Soviet automotive industry has rapidly forged ahead and now holds a leading place among the major auto producers in Europe.

Data on output illustrate the great progress.

Output of passenger cars and trucks in the USSR:

1929	1,700
1931	20,000
1933	50,000
1935	97,000
1937	200,000
1938	211,300

Last year the Soviet Union held fourth place in Europe for total output of motor vehicles, but it was the leading producer of trucks in Europe as can be seen from the following table:

Output of trucks:  
USSR, 1937—182,000, 1938—184,100;  
England, 1937—118,000, 1938—105,000; Germany, 1937—50,000, 1938—60,000; France, 1937—20,000, 1938—20,000; Italy, 1937—10,000, 1938—10,000.

000; France, 1937—20,000, 1938—20,000; Italy, 1937—10,000, 1938—10,000.

The USSR holds second place in the world for the production of trucks, the United States being the only country to surpass it.

Trucks of the following freight carrying capacity are manufactured in the Soviet Union:  $\frac{1}{2}$  ton;  $1\frac{1}{2}$  ton;  $2\frac{1}{2}$  ton; 3 ton; 5 and 7 ton.

In addition to the ordinary truck, Soviet plants also turn out vehicles equipped with special bodies such as trucks with tipping platforms, vans for transporting bread, meat products, confectionery goods and the like; trucks with tanks for liquids, fuels, milk, acids; refrigerator, fire fighting, street sprinkling and cleaning vehicles, concrete mixers, trucks with trailers, etc. Both four and six wheel trucks are manufactured in the USSR.

Production of buses is concentrated at the Moscow and Gorky plants, with the former turning out vehicles for cities while the Gorky plant produces buses adapted for rural conditions. The Soviet automotive industry is also producing a considerable number of trolley buses, a mode of city transportation fast gaining in popularity. Bus transportation systems have been introduced in Moscow, Leningrad, Kiev, Tbilisi and are spreading to other cities as well.

The main models of passenger cars are the five-seater and the seven-seater ZIS-101 limousine.

The M-1 model produced by the Gorky Auto Plant

has a 4-cylinder engine with two-point suspension. Having a compression ratio of 280 and a displacement of 195 cu. in., the engine can develop 52 hp. at 2800 r.p.m. The model has a normal speed of 62 m.p.h. on the highway. This car chalked up a speed of 91.5 m.p.h. on an asphalt road during tests at Gorky on Oct. 20, last year.

The ZIS-101 model manufactured by the Stalin Auto Plant has an 8-cylinder engine with a displacement of 351 cu. in. The engine can develop 110 hp. at 3200 r.p.m. This model can average 75 m.p.h. on a good road.

The Gorky plant will shortly begin the production of a new model equipped with a six-cylinder (Turn to page 46)

## The Brass-Hat Rack



*I had this mask made for the last dealer meeting*



# BUSINESS IN BRIEF

*Our own view of automotive production and sales;  
authoritative interpretation of general conditions*

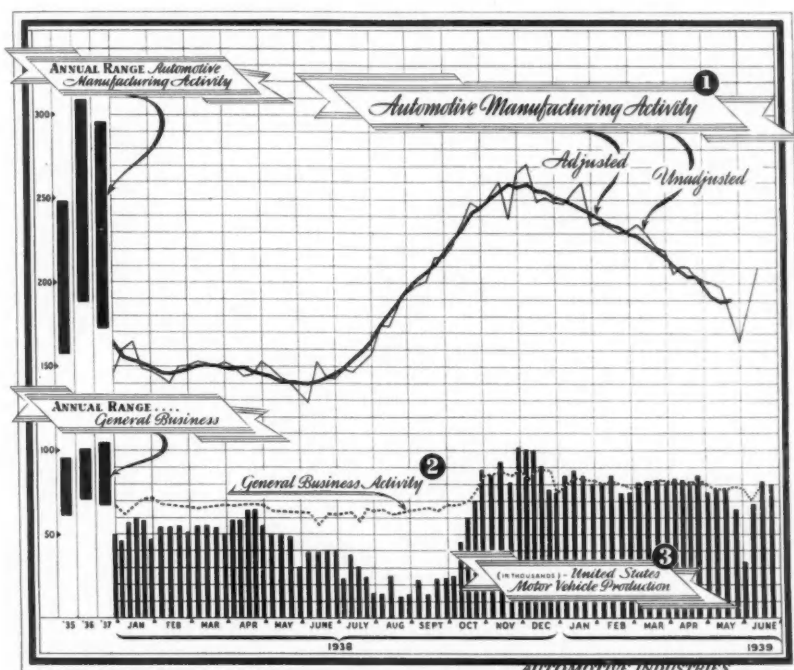
**P**RODUCTION<sup>1</sup> of passenger cars and trucks during June was held at levels considerably higher than originally anticipated due to continued strength in retail deliveries. Output during the week ending June 24 was estimated at 80,000 units to bring the total for June to that date to approximately 250,000. Production during the final week of the month was expected to remain near the level of the previous weeks to assure that June would be more than a 300,000 car and truck month and perhaps even pass May production which totaled approximately 312,000 units.

Although there have been signs of tapering off as the end of the production season approaches, major producers have been holding up unusually well, while Chrysler divisions have contributed to the industry's continued strong showing by working extra days to make up for time lost earlier in the month through the Briggs strike.

It also appears that July production will be greater than indicated several weeks ago. Although some producers completed their 1939 model run a week before the end of June and others expected to discontinue assemblies by the end of the month, a number of others are planning to run well into July and a few of the volume producers may continue throughout the month so that an output of better than 175,000 units is indicated for July.

**AUTOMOTIVE MANUFACTURING ACTIVITY** for the week ended June 10 reversed a previous down-

<sup>1</sup> 1923 average = 100; <sup>2</sup> Prepared by Administrative and Research Corp., New York. 1926 = 100; <sup>3</sup> Estimated by J. A. Laansma, Detroit News Editor, AUTOMOTIVE INDUSTRIES. <sup>4</sup> Summarized for AUTOMOTIVE INDUSTRIES by the Guaranty Trust Co. of New York.



Weekly indexes of automotive and general business  
charted

## July Production Will Exceed Forecasts

85.8 from 77.5 for the preceding week, as compared with 68.3 a year ago.

Railway freight loadings in the week ended June 10 totaled 634,597 cars, or 11.8 per cent more than in the preceding week. Loadings in the week ended June 3, reduced by the effects of holiday observance, totaled 567,732 cars, 9.5 per cent below the preceding week.

An increase in the output of electricity by the power and light industry during the week ended June 10 was contrary to the usual seasonal trend, and production was 13.3 per cent above the corresponding 1938 level. Output during the week ended June 3 registered a less than seasonal increase but was 12.5 per cent above the corresponding 1938 production.

Professor Fisher's index of wholesale commodity prices declined four fractional points in the week ended June 10 to 78.9, the lowest level reached since January, 1934. For the week ended June 3 this index stood at 79.3, one fractional point above the preceding week.

The General Motors-Cornell World Price Index of 40 basic commodities for the week ended June 10 was 61.5, the same as for the week preceding. The U. S. gold index for week ended June 10 increased to 63.2.

ward trend to climb up to an unadjusted figure<sup>1</sup> of 186 and continued climbing during the week ended June 17 to 210. The adjusted curve<sup>1</sup> hung at about the same level with an index figure of 189 for the week ended May 20 and 190 for the week ended May 27.

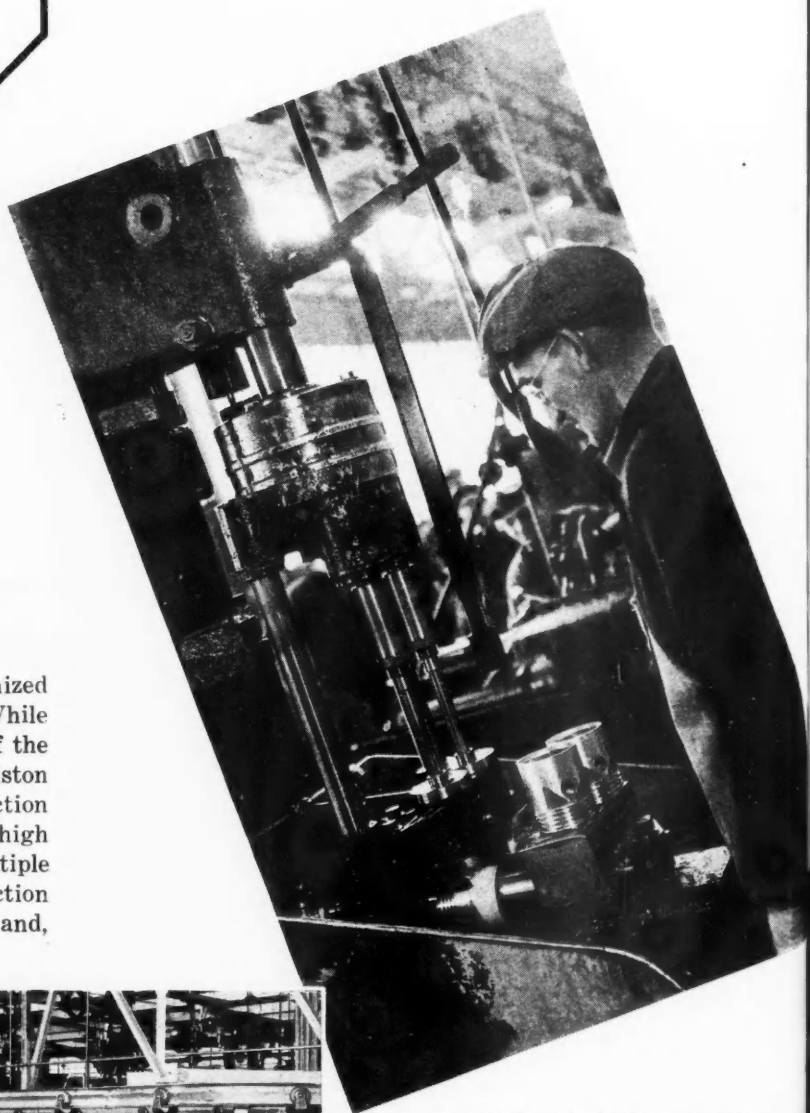
**GENERAL BUSINESS ACTIVITY<sup>4</sup>** is reported "steady." The *Journal of Commerce* index of activity for the week ended June 10, reflecting the rebound from holiday influence and the termination of certain strikes, rose to

# The Weather

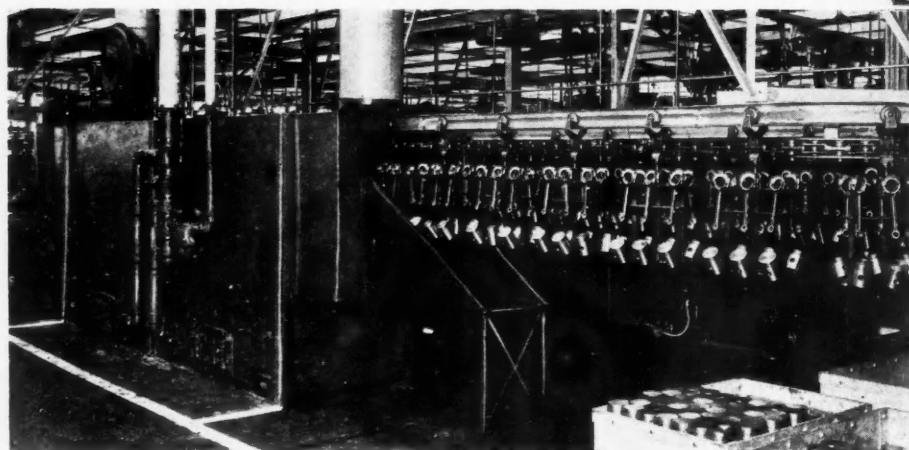
*This is the  
Thirty-ninth in the  
series of monthly  
production  
features*

**W**ITH temperatures in Detroit ranging anywhere from zero to thirty above from one day to another during winter months, the weather man plays a big part in piston manufacture. As a recent release by De Soto so aptly points out, the present day clearances in cylinder assemblies are so small, so sensitive to temperature change that modern practice must depend upon controlled temperature conditions in the final steps of machining, inspection, and assembly.

Go where you will in the industry, piston manufacture is invariably one of the best organized and best mechanized departments in any plant. While this is due to many basic reasons, doubtless one of the most favorable is the very physical form of a piston since the cylindrical or even elliptical cross-section lends itself so admirably to processing on modern high production equipment. Moreover, with multiple cylinder engines, pistons represent sizeable production lots even in moderate volume of engine production and,



*(Above) Baker drill press, with two-spindle attachment, on piston line at Chrysler, core drilling wrist pin hole, at rate of 300 per hour*



*(Left) One of the special Blakeslee washing machines found in the Indianapolis plant of International Harvester Co.*

July 1, 1939

Automotive Industries



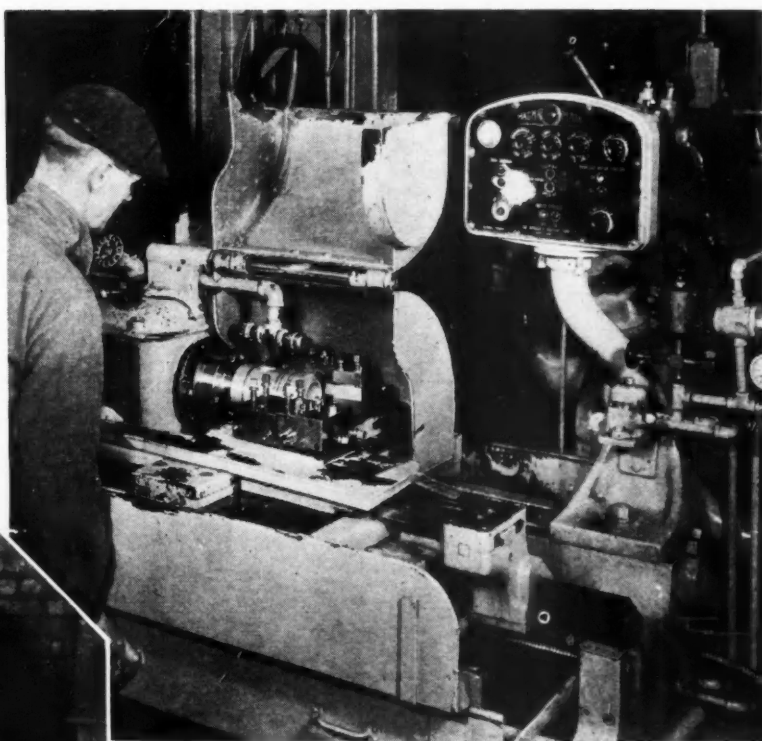
# Man Takes A Hand

***and forces the introduction of controlled temperature in the final steps of piston production. Here is a resume of the procedure in several important plants***

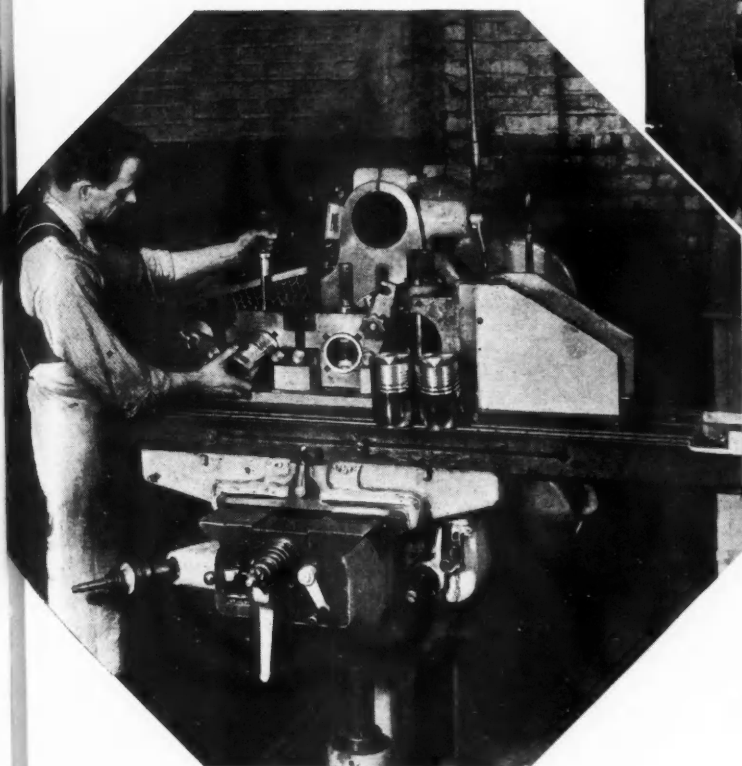
consequently, can profit by mass production methods.

Object of this article is to present a brief perspective of piston practice in some outstanding plants representing a cross-section of activity in the field of passenger cars, motor trucks, tractors, industrial equipment. Because of the many variables that enter into the picture, such as—design features, type of material, volume of production, etc., there is little point in attempting a generalization of industry-wide practice. So far as we can see, the best exposition of the matter resides in a study of individual set-ups.

Nevertheless, a few important generalizations may be made in the light of similarity of certain basic operations. For example, many, if not all pistons, are



***Unique Monarch Magnamatic lathe at Caterpillar, rough turning outside diameter, ring grooves, etc.***



***(Left) This No. 3 Cincinnati milling machine is set up at Caterpillar for milling valve clearance in piston***

elliptically ground either on cylindrical grinders with cam-grinding attachments or on Cincinnati centerless grinders. For turning, a number of manufacturers use automatic chucking machines such as the Baird multiple-spindle machine, while many rely upon the familiar turning machines such as the Fay automatic

PRODUCTION

lathe, Lo-Swing lathe, and the Sundstrand stub lathe.

Due to the requirements of precise alignment and dimensional accuracy, the wrist pin hole is almost universally finish-bored on Heald Bore-Matic or Ex-Cell-O precision boring machines. On anodized pistons, precision boring with the diamond or cemented-carbide tool is almost the only practicable means of finishing.

Too, it is also almost a truism that cemented-carbide tools are an essential for many important piston operations, and indispensable on certain aluminum alloys.

Precision of weight and dimensions take on new significance with today's accent on oil economy and cylinder bore life. While there is close control of all machining operations to assure accuracy, when it comes to finishing operations and connecting rod assembly, they go much further in most plants. As will be noted later, these operations are performed under controlled temperature conditions, frequently in specially built temperature-controlled booths.

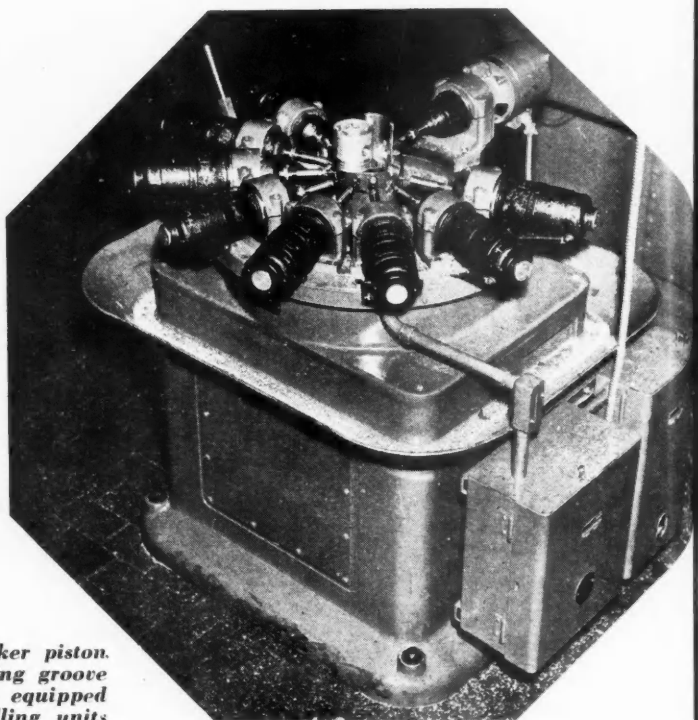
Control of dimensional accuracy is assured by the use of many high grade conventional gages; also Pratt & Whitney Electrolimit gage, Sheffield amplifiers, and others. How these instruments are used in sorting pistons will be mentioned later on.

Depending on the method of assembly, as well as upon the type of equipment on the machine line, pistons are produced either to exact or common weight or balanced within fine limits. Many plants now use the special Morris or Snyder balancing machines which mill each piston automatically to exact weight.

As an example along this line, we quote from a recent statement by L. K. Marshall, Pontiac Motors ser-

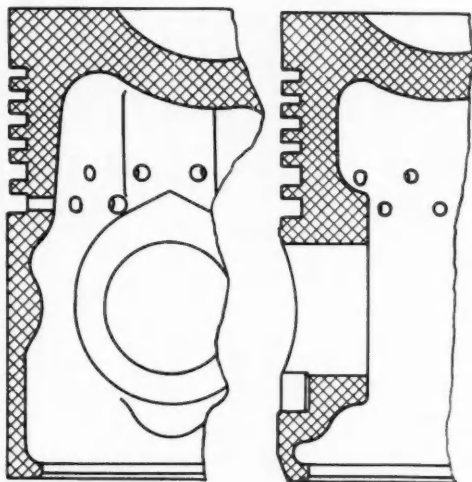
vice manager, in which he advises that all Pontiac pistons are made to a uniform weight within limits of 1/16 of an ounce. Even replacement pistons up to 0.030 in. oversize weigh exactly the same as standard pistons so as to assure proper balance in overhauled or repaired engines. These pistons, made of a special chromium-nickel alloy iron, are cast with a balancing ring which can be machined to remove excess weight within the required limits.

The survey represented here is well rounded with



*This Krueger machine on the Studebaker piston line is set up to drill eight holes in ring groove and one saw relief hole. Machine is equipped with nine Govro-Nelson automatic drilling units*

## Caterpillar Factory Piston Routing



### OPERATION

Bore diameter, face and chamfer skirt

Rough turn outside diameter and ring grooves. Rough face and chamfer top. Finish turn outside diameter on top end and chamfer ring grooves.

Rough bore pin hole and turn wrist pin and oil hole relief

Drill all holes in top and bottom ring grooves and drill angular holes

Finish turn outside diameter, finish cut ring grooves, face end, form spherical radius and finish bore pin hole

Mill wrist pin keeper slots

End mill clearance on bottom of piston

Mill valve clearance

Burr, stamp and clean

### EQUIPMENT

Special caterpillar design drill using 21 in. Cincinnati Bickford head  
14 x 18 in. Monarch magnetic double carriage lathe, 6 x 11½ in. Sundstrand stub lathe

Special Caterpillar design drill using 21 in. Cincinnati Bickford head  
17 in x 4 ft. 3 in. LeBlond engine lathe

Kingsbury semi-automatic indexing type drilling machine (4-spindle)

No. 216A Ex-Cell-O special 4-station precision boring machine

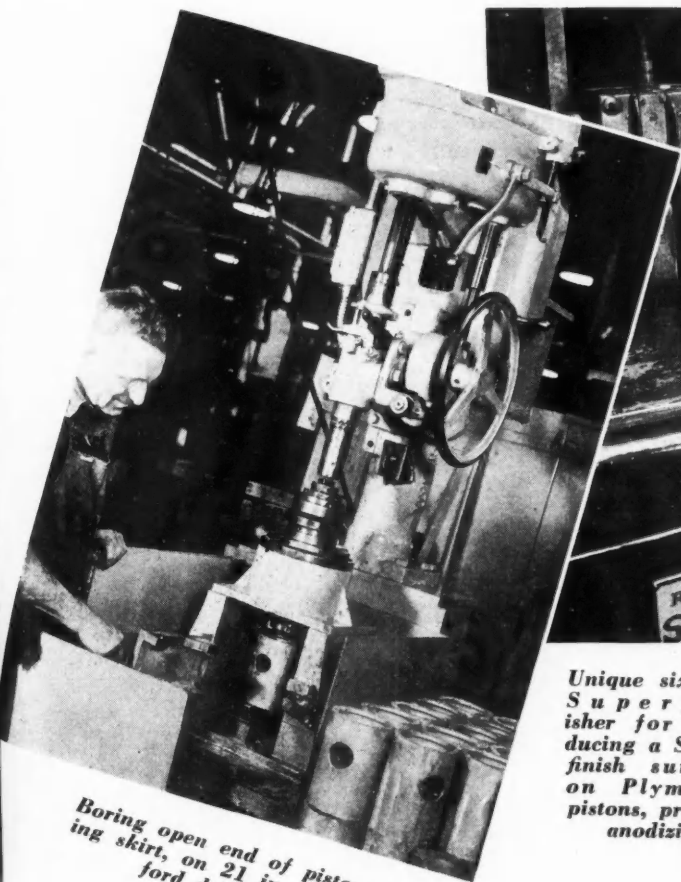
No. 1 U. S. Improved hand mill

No. 1 U. S. Improved hand mill

No. 3 Cincinnati plain horizontal mill

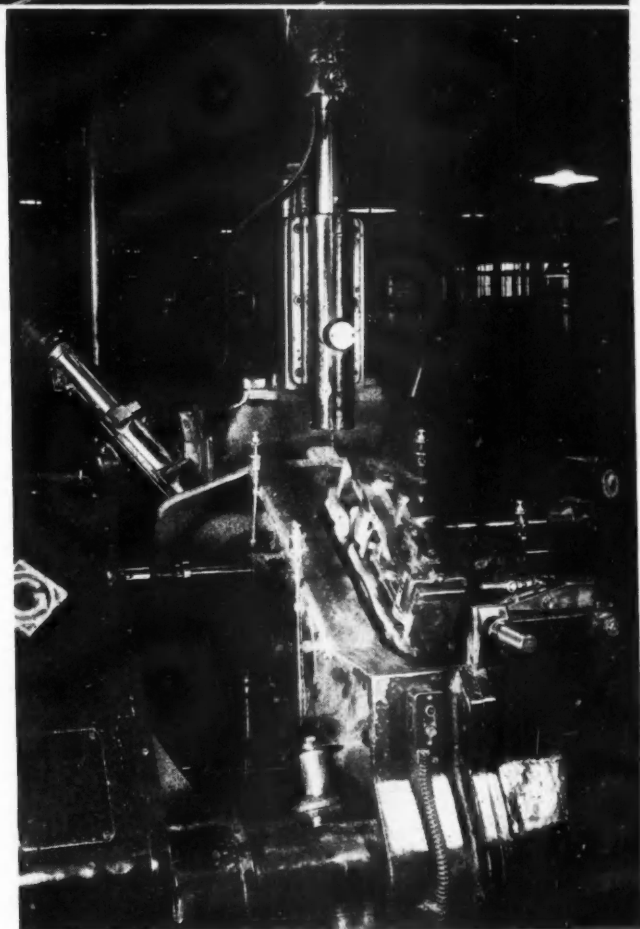
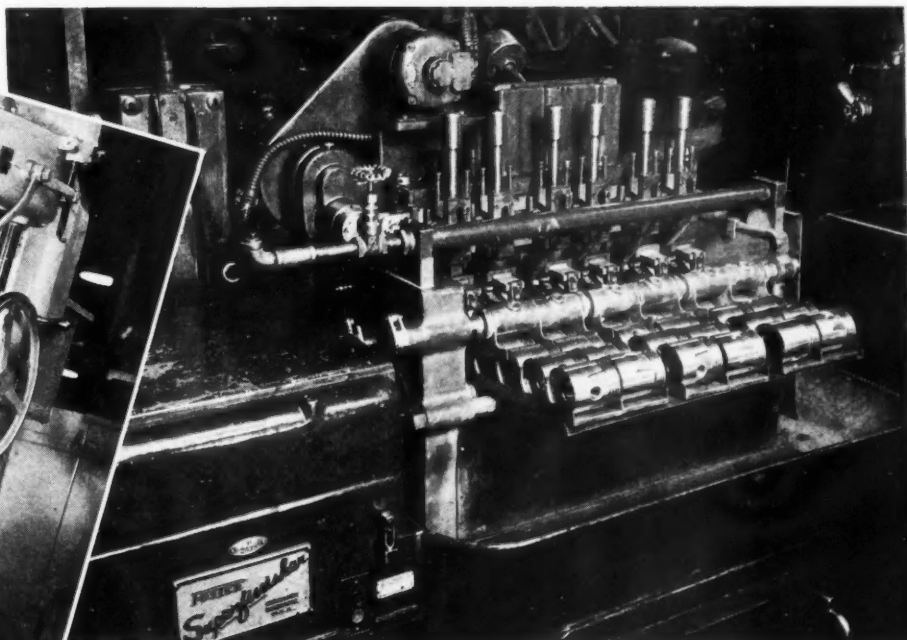
Bench





*Boring open end of piston, chamfering skirt, on 21 in. Cincinnati Bickford drill at Caterpillar*

*Unique six-lane Superfinisher for producing a Superfinish surface on Plymouth pistons, prior to anodizing*



*Close-up of work station of special Greenlee, automatic drilling and sawing machine on the Packard piston machine line*

the introduction of official factory routings giving the sequence of operations as well as the equipment on which such operations are performed. These details are supplemented by a drawing of each piston, made from official blue prints. Finally, there is a pictorial section with illustrations of certain key operations in each of the plants included in the survey.

We are particularly indebted to the following organizations for their cooperation in making available their piston practice for this article: Buick, Caterpillar Tractor Co., Chrysler, Continental Motors, International Harvester Co., Nash, Packard Motor Car Co., Plymouth, Studebaker Corp.

Details of piston manufacture in each of these establishments will be discussed in the succeeding sections within the limits of the data made available for this purpose.

### **Buick**

Buick pistons, featuring the special domed head for combustion control, are cast in a special aluminum alloy, GM Specification 4145N. They are heat-treated to develop a minimum tensile strength of 30,000 psi, Brinell hardness ranging from 90-120. They are cam-ground, elliptically, measured at the major diameter for grading.

Interesting feature of the Buick set-up is the use of a comprehensive scheme of grading which is best explained by reference to the factory routing else-

where. In general, the pistons are graded and marked (by coding) for outside diameter size and are selectively fitted to cylinder bores within a tolerated variation of 0.0015 in., minimum; 0.0021 in., maximum. Grading is done in a separate booth having a controlled temperature around 70 deg. Fahr.

In operation, at assembly, in order to maintain these fits on a production basis, the information covering bore size for each cylinder is teletyped to the piston and rod assembly booth where the assemblies are selected in matched sets of eight, earmarked for each specific block on the assembly line.

All pistons are machined to standard weight of 0.89 lb. plus or minus 0.0039 lb.; or 403.7 grams plus or minus 1.75 grams.

The factory routing for machining as well as the set-up for assembly in the booth, tell the whole story quite effectively. Turning is done on Fay automatics, rough and finish-grinding on Norton grinders. Pistons are anodized in a Meaker automatic machine, then the wrist pin hole is diamond-bored to size.

It is of interest to note that the saws on the Kingsbury drilling and sawing machine have inserted teeth, tipped with Carboloy.

### Caterpillar

The "Caterpillar" piston described here is of special domed design used on the new line of diesel engines. It is obtained from two sources—Lynite and Bohnalite "Y", precipitation hardened aluminum alloys developing a surface hardness of 80 Brinell, minimum.

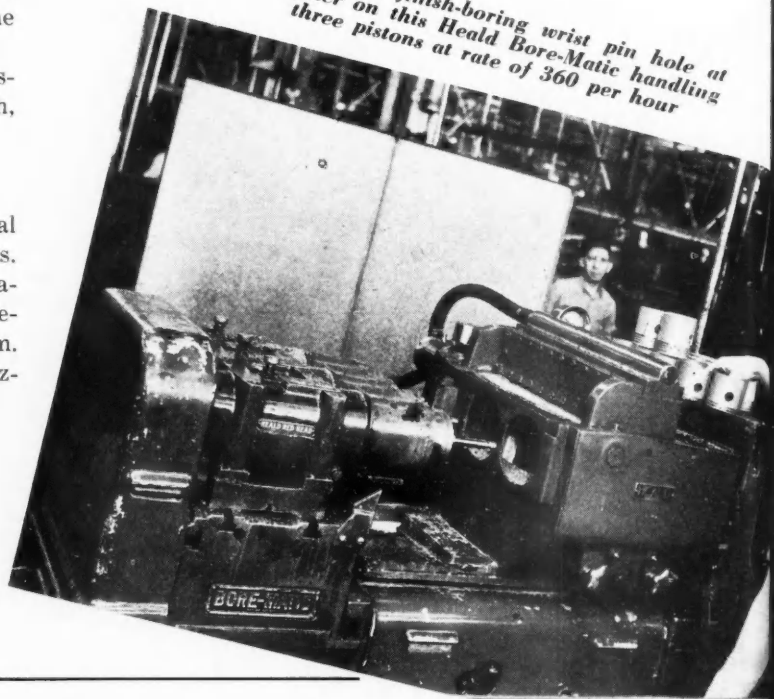
The routing is extremely compact and simple, utilizing some interesting production equipment. Interesting is the Monarch Magnamatic which handles all of the turning and ring grooving operations in one setting. A four-spindle Kingsbury indexing machine is used to drill all holes except the wrist pin holes. All finishing operations are performed on a four-station Ex-Cell-O precision boring machine.

### Chrysler

The Chrysler piston is of aluminum alloy, anodized after machining as indicated on the routing. It is elliptically ground in cross-section, tapered from top to bottom, with maximum diameter at bottom. Finished dimensions and grading are specified at a standard temperature of 70 deg. Fahr. Total weight of finished pistons is 495 grams plus or minus two grams.

The machine shop routing, characteristically, is longer than the average of those listed in this article

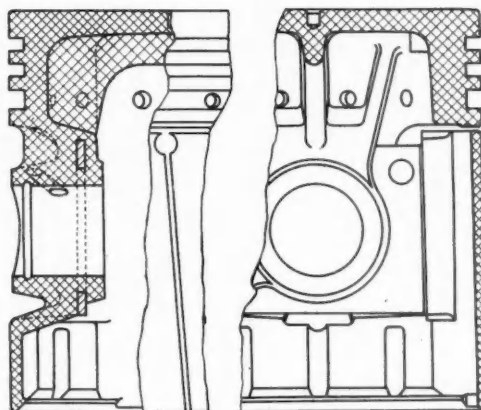
*Rough and finish-boring wrist pin hole at Chrysler on this Heald Bore-Matic handling three pistons at rate of 360 per hour*



## Packard Factory Piston Routing

OPERATION	EQUIPMENT
Inspect	
Rough turn outside diameter and ring lands, rough form three ring grooves and chamfer rough face, center closed end, face and chamfer open end	No. 14 New Britain automatic lathe
Drill 12 holes in No. 3 ring grooves and blow out	Kingsbury drilling machine
Core drill wrist pin hole, cut lock wire grooves, drill 4 holes in wrist pin bosses, 1 in skirt. Saw 2 slots under No. 3 ring land and 1 slot in skirt	Greenlee drill and sawing machine
Ream wrist pin hole to 0.842 diameter	U. S. reamer drive
Recenter closed end. Face and chamfer 45 degree angle, open end	Sundstrand automatic lathe
Finish turn outside diameter and ring lands. Finish form ring grooves. Chamfer and finish face head. Burr sharp edges at ring grooves.	Sundstrand 10 in. automatic stub lathe
Rough grind outside diameter	Cincinnati hydraulic piston grinder
Finish grind outside diameter	Cincinnati hydraulic piston grinder
Face off center boss	No. 2 Leland - Gifford single spindle drill
Wash in oleum spirits and blow off	Wash tank with air suction

OPERATION	EQUIPMENT
Bore piston for weight	Morris piston balancing machine
Diamond bore wrist pin hole	Ex-Cell-O precision diamond boring machine
Remove all burrs	
Wash	
Pin plate	
Inspect, stamp letter, weigh, grade, place in container	





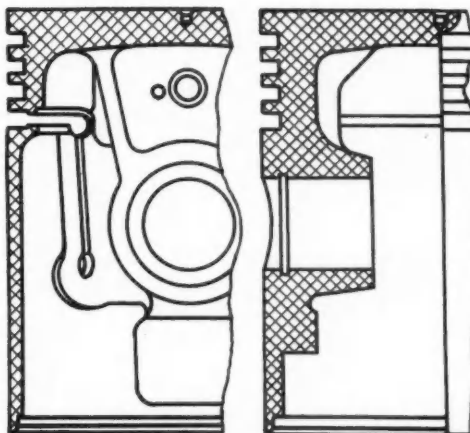
## Chrysler Factory Piston Routing

### OPERATION

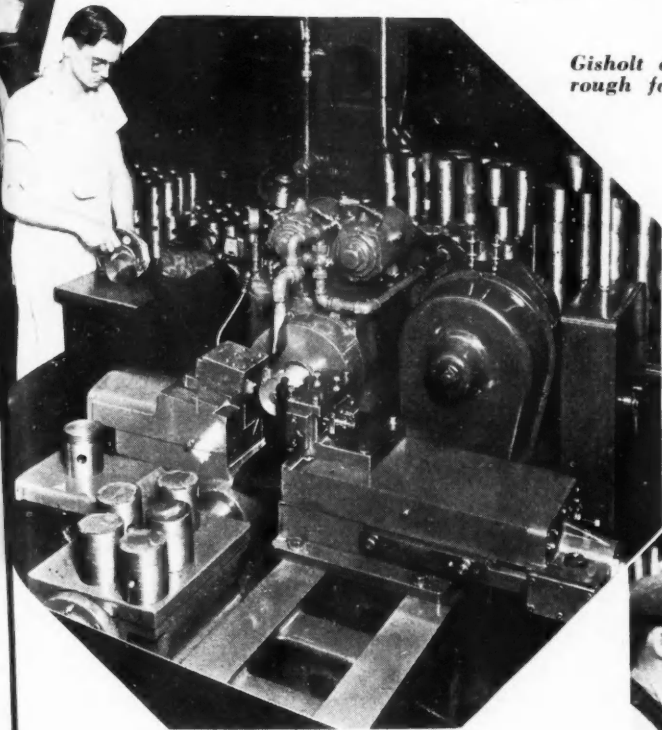
Inspect casting  
Bore, face and center open end and center head end  
Face, turn, groove and chamfer  
(a) Load  
(b) Rough cam turn and rough face head end  
(c) Rough turn ring grooves and finish turn lands  
(d) Finish cam turn and finish face head end  
(e) Finish turn and chamfer grooves  
Core drill wrist pin hole (2 parts at a time)  
Cut lock ring groove and chamfer wrist pin hole  
Drill 8 holes in No. 3 groove, 3 holes in No. 4 groove and 4 holes for saw slots

### OPERATION

Saw 1 Horizontal and 2 vertical slots  
Machine to weight  
Burr saw slots and oil holes  
Recenter open end  
Cam grind outside diameter of skirt and burr open end  
Wash and blow off  
Hone outside diameter of skirt (6 parts at a time)  
Load racks and place on conveyor for anodizing  
Rough and finish diamond bore wrist pin hole (3 parts at a time)  
Remove head center boss  
Wash and blow off  
Inspect  
Grade, stamp, check skirt end and remove burrs  
Pack in carton



*Gisholt automatic lathe, rough boring and rough facing skirt on piston line at IHC Indianapolis plant*



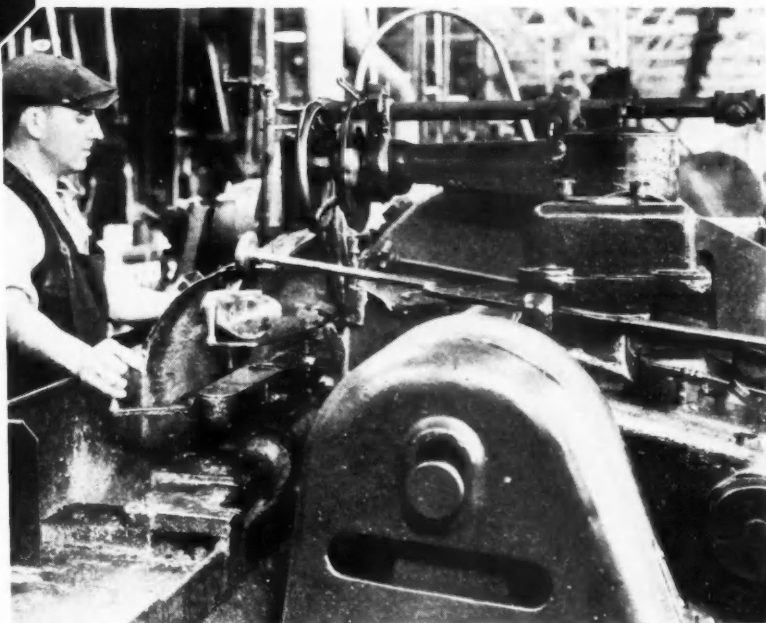
ledo scale. Landis grinders are used for cam-grinding the outside diameter.

The Chrysler set-up features the first use of the Foster Superfinisher which develops an exceptionally fine surface finish free of the amorphous material that usually wears off during run-in and changes the original assembly clearances. Pistons are anodized immediately after Superfinishing.

The final operation, grading, is accomplished with the use of the P & W Electrolimit gage, in the follow-

due to greater sub-division of functions and, consequently, a wider range of specialized machines. A Fay automatic handles all of the initial roughing operations on skirt of piston and finishes the ring grooves, lands and top of piston. Machining to weight is accomplished on the familiar Morris mill equipped with a To-

*Cam-grinding piston outside diameter at Chrysler on one of battery of Landis hydraulic grinders, at rate of 110 pieces per hour*



## Studebaker Factory Routing

### Piston and Pin Assembly--Standard

#### OPERATION

Bore and face open end and center other end  
 Rough drill cross hole  
 Rough turn, rough and finish face head, finish land, rough and semi-finish ring grooves and oil grooves, finish cam turn outside diameter and recenter  
 Drill smoke holes and  $\frac{3}{8}$  in. hole  
 Drill 2 holes for slots and mill both slots  
 Center open end  
 Finish cut ring grooves  
 Finish cam grind outside diameter  
 Burr grooves, head, skirt, and oil grooves  
 Rough and finish diamond bore pin hole  
 Wash and blow off  
 Balance  
 Wash and plate  
 Fit pins

#### EQUIPMENT

No. 5 Warner and Swasey screw machine  
 Davis & Thompson drill  
 Baird machine

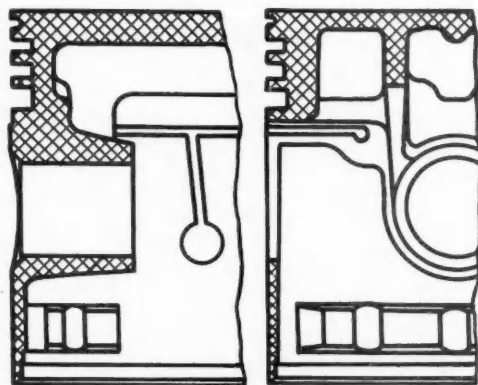
Kreuger drill

Kreuger drill and mill

1-spindle Leland - Gifford drill  
 LeBlond lathe  
 Norton grinder

Speed lathe

Ex-Cell-O diamond bore machine  
 Tank  
 Morris balancing machine  
 Tanks  
 Bench



ing range of sizes:

Grade	Diameter A	Diameter B — ± 0.001
A	3.3745	3.3631
B	3.3750	3.3636
C	3.3755	3.3641
D	3.3760	3.3646
E	3.3765	3.3651

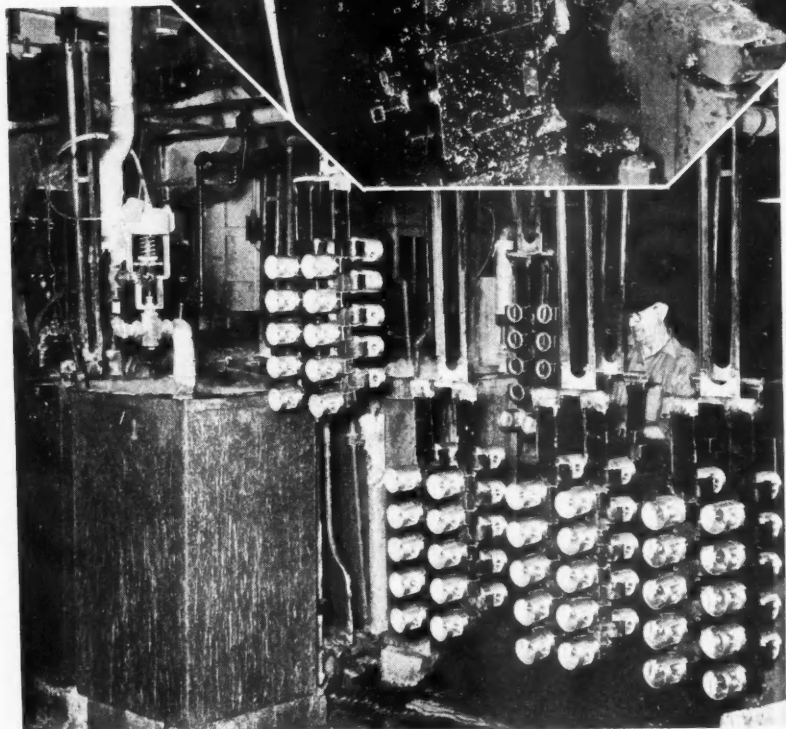
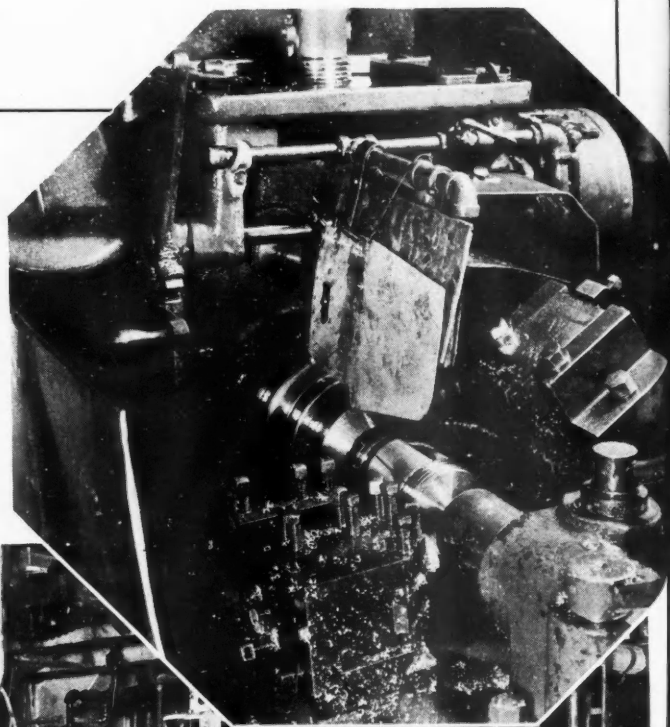
#### Continental

The piston chosen for discussion is an example of a high production line at Continental, machining 720 per hour or 14,400 pieces per day on a 20-hour run. It is made of aluminum alloy, purchased from four principal suppliers—Aluminum Co. of America, Bohn, Aluminum Industries, and Sterling Products. Pistons are heat-treated by the suppliers, developing a Brinell hardness ranging from 115-140.

Finish-machined pistons are bored out to standard weight falling within the range of 287 to 291 grams.

Layout of the machine shop and its mechanization are outstanding and worthy of special mention. In the first place, pistons progress from operation to operation on a belt conveyor except for washing and drying where an overhead conveyor line is employed. Following the boring of wrist pin holes, the pistons are placed on an overhead conveyor, carried through the washing, drying, and cooling operations, the latter cool-

*Turning operations on Nash pistons are performed on a battery of Fay automatic lathes, shown here, and Lo-Swing lathes*

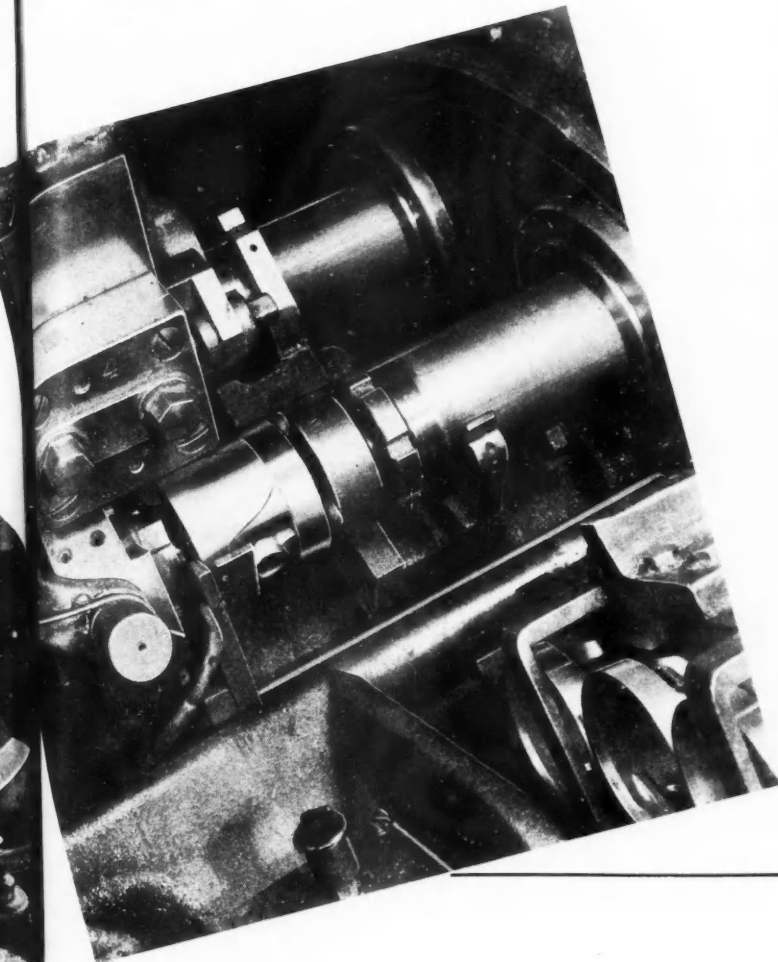


*View of piston anodizing equipment at Buick, showing method of racking work on the automatic conveyor*



ing the work down to about 70 deg. Fahr., then transported directly into the final inspection room.

Final inspection is carried on in a special enclosed booth, completely air-conditioned, maintaining a uniform temperature range between 68 and 72 deg. Fahr., the year around. This set-up assures the maintenance of standard dimensions under specified conditions of operation.



Among the outstanding items of equipment on the line are—the big 6-spindle Greenlee chucking machine; a battery of four 6-spindle Baird chucking machines; a special 8-spindle machine for drilling oil holes and holes for slot saw. Saw slots are cut on a 2-spindle Sundstrand Rigidmill, fitted with a 10-station rotary indexing table. A battery of four Ex-Cell-O, 3-spindle precision turning machines handles the elliptical turning of the outside diameter; cemented-tungsten-carbide tools are employed for this operation.

The finished pistons are graded to size in three groups as follows: 0.0005 in. undersize, standard and 0.0005 in. oversize.

### International Harvester

The piston described here is produced for the Fort Wayne truck plant by the new engine plant in Indianapolis. It is made of cast iron, annealed before machining to relieve internal strains. Hardness—Rockwell 74-90, B-scale.

Standard weight is 1 lb. 14 oz., plus or minus  $\frac{3}{4}$  oz. Each piston in a set of six must be of same weight within  $\frac{1}{4}$  oz.

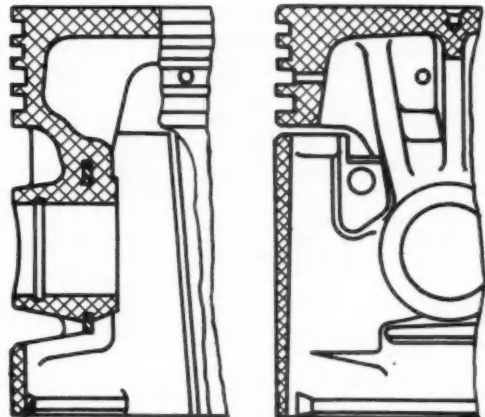
The sequence of operations reproduced elsewhere in the article will provide a good impression of the modernity of set-up, emphasizing the use of high production equipment of advanced character. Note particularly the big Davis and Thompson 12-spindle rotary drilling machine; the battery automatic lathes for semi-finish turning of the outside diameter, Cincinnati centerless grinder for rough grinding and finish-grinding of the outside diameter.

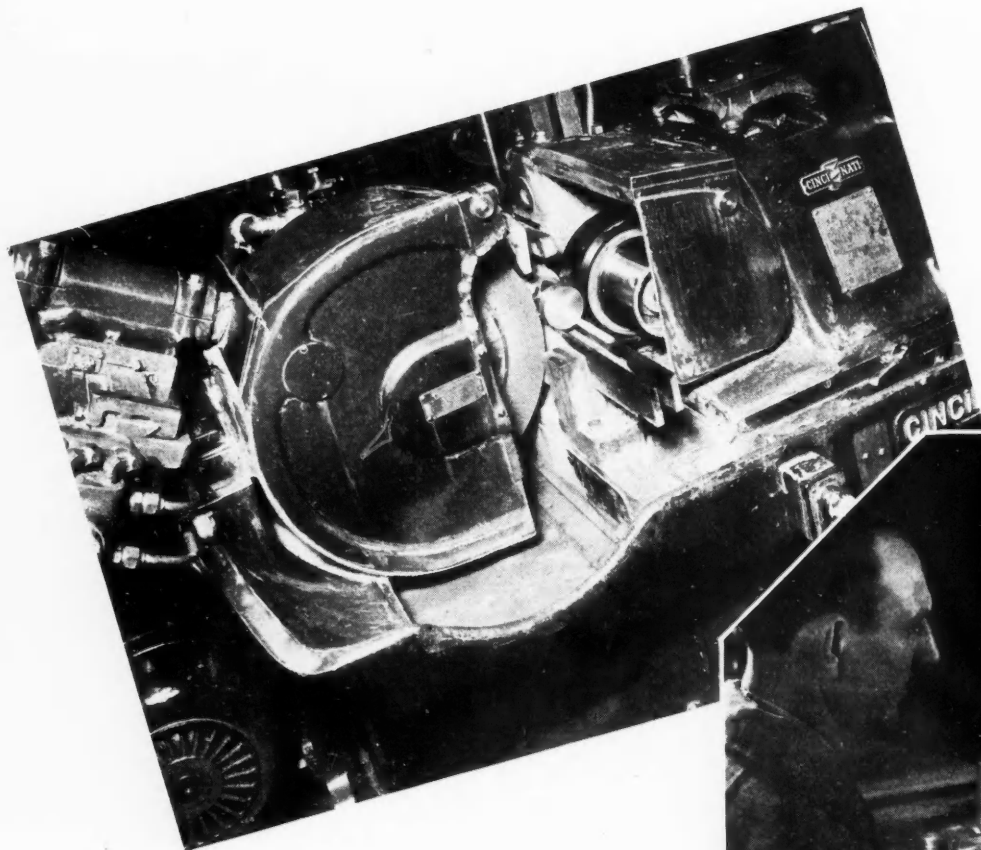
Other interesting points are the three washing oper-

*Boring, facing, and countersinking open end of piston on special Greenlee chucking machine at Continental*

## Nash Factory Piston Routing

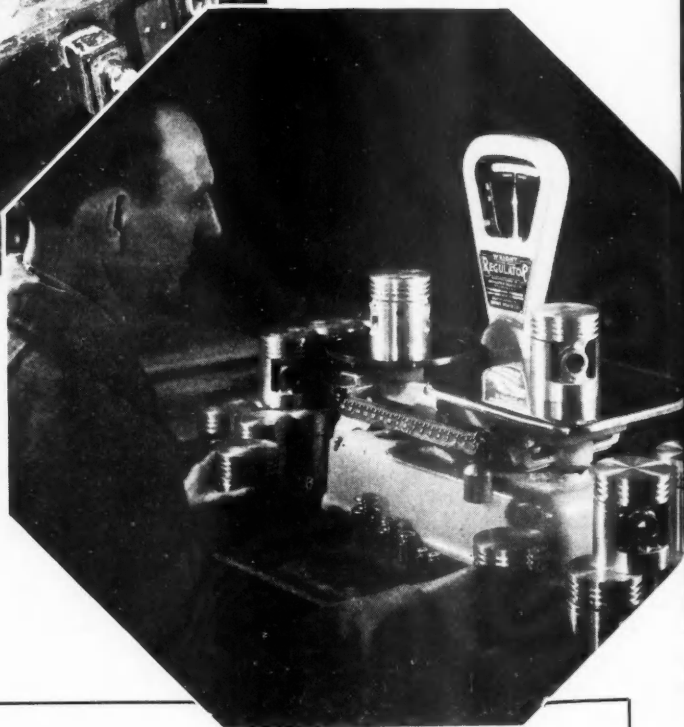
OPERATION	EQUIPMENT
Rough bore and face open end—center closed end and core drill hole	Millholland duplex drill
Rough turn outside diameter and rough groove and finish face end	Lo Swing Robot Fay lathe
Mill two $\frac{3}{32}$ in. slots	No. 1 Kent Owens hand mill
Mill one $\frac{3}{64}$ in. slot	No. 1 Kent Owens hand mill
Drill oil holes in pin bosses	2-spindle Avey drill
Rough file face of skirt	1-spindle Avey drill
Rebore open end	Fay lathes
Finish turn grooves and outside diameter	Millholland drill
Drill oil holes in Nos. 3 and 4 grooves	Norton grinder
Clean with air	Leland-Gifford drill
Grind outside diameter and groove lands	Heald Borematic
Cut lock ring grooves in pin hole	
Diamond bore pin hole	
Weigh and stamp	





(Left) Plymouth pistons are rough and finish cam ground on centerless grinders

(Below) Packard piston weight is checked on sensitive "Regulator" scales made by the Howe Scale Co.



ations in Blakeslee washing machines, and use of the Sunnen lapper with chamfering attachment for lapping and chamfering the wrist pin hole, after precision boring.

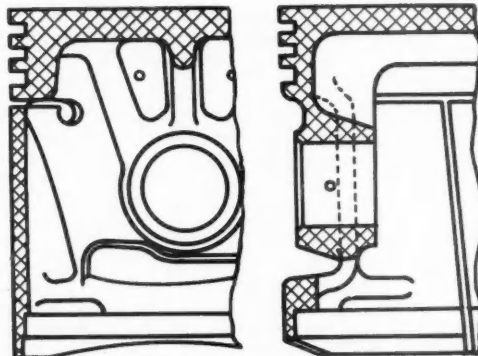
### Nash

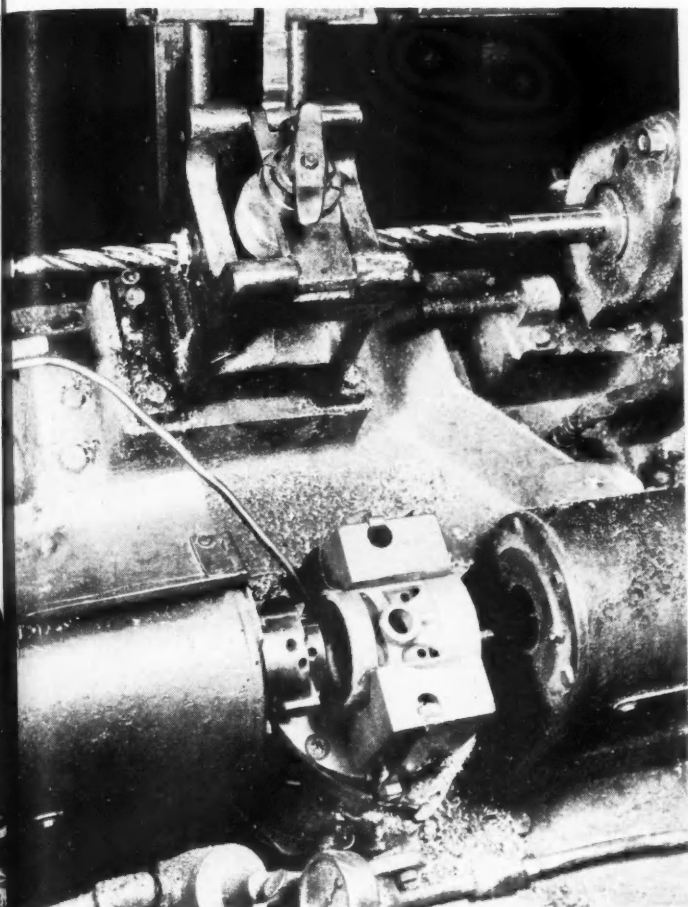
The Nash piston described here is a Nelson Bohna-

## Continental Factory Piston Routing

OPERATION	EQUIPMENT
Inspect casting	
Bore, face and countersink open end	Special Greenlee 6-spindle chucking machine
Turn outside diameter (3 cuts), rough and finish ring grooves and lands. Rough and finish face closed end	4 6-spindle Baird chucking machines
Drill 8 smoke holes in ring groove	Special 8-spindle machine
Drill piston pin oil holes and runout holes for saw slots	Special 8-spindle machine
Wash in a hot water spray at 120 deg. Fahr. and blow off with hot air to remove all moisture and chips	Special automatic washer and blowoff
Weigh and bore out excess weight	
Saw 2 slots below oil ring land	2-spindle Sundstrand rigidmill
Turn outside diameter elliptical	Ex-Cell-O 3-spindle hydraulic turning machine
Saw skirt and stamp "Front" on closed end	Sundstrand rigidmill
Burr saw slot in skirt	Hand tool
Burr ring grooves	4-spindle vertical rotary Baird
Rough and finish bore piston pin hole	Ex-Cell-O 6-spindle hydraulic two-way boring machine

OPERATION	EQUIPMENT
Wash in hot water of 120 deg. Fahr. and blow off with hot air to remove all moisture and chips	Special washing, drying, cooling and conveying machine
Cool to 70 deg. Fahr. and convey to inspection room	
Inspect finished part	





lite permanent mold casting, heat-treated to develop a Brinell hardness ranging from 125 to 160.

Machine shop set-up, as indicated on the routing, features Lo-Swing and Fay automatic lathes for turning, boring, and ring grooving operations; Norton grinders for finish-grinding the outside diameter and ring lands; Heald Bore-Matic for precision boring the wrist pin hole.

Millholland drilling machines are used for the first operation—rough boring and facing the open end; for drilling the oil holes.

Pistons are sorted in sets so that the weight variation in any motor does not exceed 1/32 gram. They are graded for size to 0.0003 in.

### Packard

The piston described here is a permanent mold aluminum alloy casting of Bohn Autothermic type, tin plated after machining. The castings are heat treated for 9 hours at 375-400 deg. Fahr., in dry heated air, cooled slowly. This treatment develops the required physical properties and results in a Brinell hardness of 90-120.

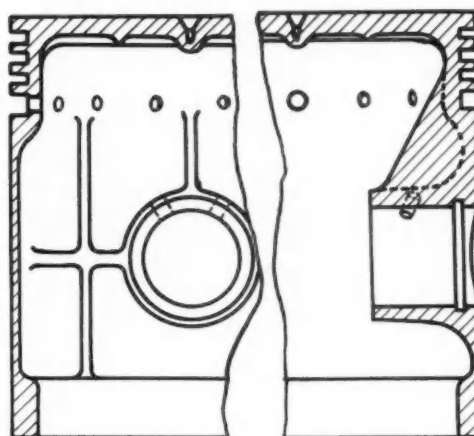
The routing indicates the character of machine operations and equipment, emphasizing a modern high production set-up. Initial roughing is performed on a

*Interesting multiple-operation Millholland drilling machine at Nash for rough boring and facing open end, other operations*

## IHC Factory Piston Routing

OPERATION	EQUIPMENT
Rough casting received annealed and sealed inside	
Rough bore and rough face skirt	No. 12 Gisholt automatic lathe
Drill piston pin hole	Davis and Thompson 12-spindle rotary drilling machine
	10 inch Sundstrand stub lathe
Rough turn outside diameter	17 in. W.F. & John Barnes automatic lathe
Semi-finish turn outside diameter and ring lands; rough cut ring grooves and rough face top end	10 in. Model "B" Sundstrand automatic lathe
	12 in. Gisholt hydraulic automatic lathe
Finish bore, face and chamfer open end and center top end	(2) 10 in. Model "B" Sundstrand automatic lathes
Finish turn outside diameter of body and ring lands. Finish cut ring grooves and finish face top end	(2) Ex-Cell-O precision turning machines
Rough grind outside diameter of body	No. 2 Cincinnati centerless grinder
Rough bore piston pin hole	3-spindle Ex-Cell-O precision boring machine
Face inside of piston pin bosses and cut piston pin retainer grooves	Ex-Cell-O special machine
Weigh and bone to weight	No. 9 Nateco single-purpose Hi-duty drill Toledo Scale
	Blakeslee washing machine
Wash	No. 5 Cincinnati centerless grinder
Finish grind outside diameter	Blakeslee washing machine
Wash	(2) Ex-Cell-O 2-spindle double-end precision boring machine
Finish bore piston pin hole	

OPERATION	EQUIPMENT
Drill oil holes in piston pin bosses	Edlund No. 1-b-1 High-speed drill
Drill oil return holes in lower ring groove	Kingsbury single-spindle B-A drilling machine
Lap and chamfer piston pin hole	Model "L" Sunnen lapper with chamfering attachment
Wash	Blakeslee washing machine
Weigh	Toledo scale
Inspect, cannon gauge, and stamp size; gauge and mark with paint for piston pin hole sizes	Bench





New Britain-Gridley automatic lathe. Finish turning operations are handled on a battery of Sundstrand Stub lathes.

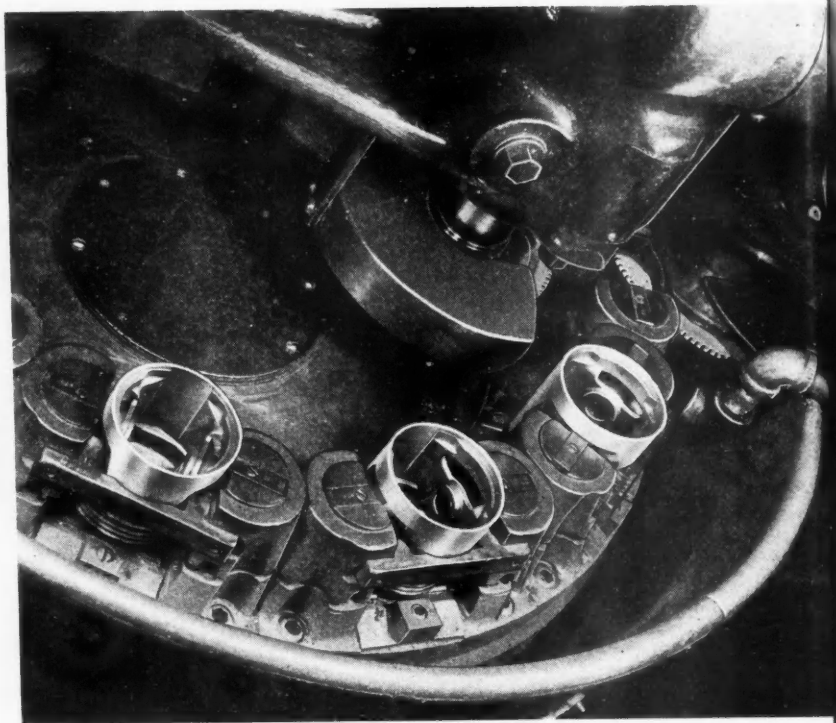
The piston is cam ground, using Cincinnati centerless grinders both for rough and finish. The wrist pin hole is bored on an Ex-Cell-O precision boring machine, using tungsten carbide tipped tools for rough boring and diamond tools for finish boring. A Greenlee drilling and sawing machine is used for core drilling, cutting lock wire grooves, drilling four oil holes in wrist pin bosses and sawing the three slots in skirt.

Finished pistons are balanced and bored to common weight on the familiar Morris balancing machine. They are selected in sets of eight for motor assembly within a maximum variation in weight of 4 grams for each set.

Precision gaging of all important dimensions is a basic part of the final inspection, an Electrolimit gage being used for checking the wrist pin holes. Pistons are graded for size into eight different grades, designed to provide an actual clearance in the cylinder bore from 0.0005 to 0.0001 in. The grades for a nominal diameter of 3.25 in. are as follows:

3.24875 — 3.24900	3.24975 — 3.25000
3.24900 — 3.24925	3.25000 — 3.25025
3.24925 — 3.24950	3.25025 — 3.25050
3.24950 — 3.24975	3.25050 — 3.25075

*Continental Motors has this interesting 2-spindle Sundstrand Rigidmill set-up for saw slots below oil ring land*



## Plymouth

This is an aluminum alloy piston, elliptically ground, with tapered skirt. Total weight of finished pistons is 409.5 grams plus or minus 2 grams. They are graded for size into five classifications, varying by steps of 0.0005 in.

The machine shop set-up at Plymouth deserves special attention not only because it represents one of the

## Plymouth Factory Piston Routing

### OPERATION

Inspect casting  
Bore face and chamfer open end  
Core drill, drill and chamfer wrist pin hole, undercut wire retainer groove and ream wrist pin hole  
1st Station: Load 2 pieces  
2nd Station: Core drill, drill and chamfer wrist pin hole  
3rd Station: Undercut wire retainer groove in wrist pin hole  
4th Station: Ream wrist pin hole  
Turn outside diameter, turn ring grooves, face and chamfer head end and lands, chamfer outside diameter at open end  
Station No. 1: Load  
Station No. 2: Rough turn outside diameter half way  
Rough groove ring grooves  
Rough face head end  
Station No. 3: Second rough turn outside diameter of head end, rough turn outside diameter of skirt all way

### OPERATION

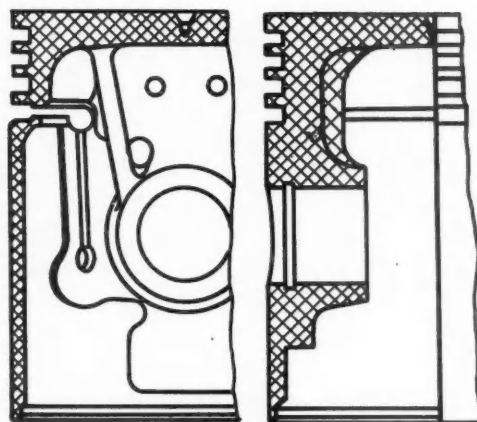
Station No. 4: Finish face head end  
Chamfer ring grooves, turn radius on head end, turn 20 degree angle at top of skirt, chamfer bottom of skirt  
Station No. 5: Semi-finish, turn head end and skirt  
Station No. 6: Finish turn ring grooves and finish chamfer 20 degree angle on lower groove  
Finish turn outside diameter of head and skirt  
Inspect  
Drill 3 holes in No. 4 ring groove, drill 4 slot holes  
Drill 8 holes in No. 3 ring groove  
Saw 1 horizontal slot and 2 vertical slots  
Rough cam grind outside diameter  
Finish cam grind outside diameter  
Blow out with air  
Weigh and machine to common weight  
Blow out with air  
File burrs at outside diameter of open end, in-

### OPERATION

spect ring grooves and check weight  
Superfinish outside diameter  
Load in racks and hang on conveyor  
Anodic plate  
Unload from rack and distribute to diamond boring machines  
Rough and finish diamond

### OPERATION

bore wrist pin hole  
Hot water wash  
Run thru temperature control to reduce temperature to 70 deg. Fahr.  
Inspect wrist pin hole  
Inspect outside diameter and grade for size  
Stamp trade mark and size



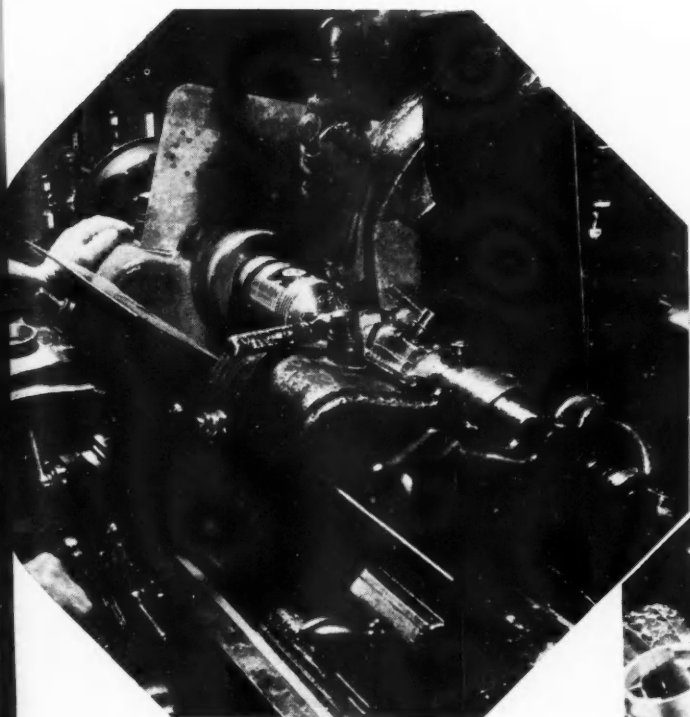
highest production lines in the industry but also because it emphasizes some features of advanced practice. The routing gives the details of operations and equipment on the line, requiring but little further amplification. What is not evident in the routing, how-

ever, is the important point that the current layout separates roughing from finishing operations in no uncertain fashion.

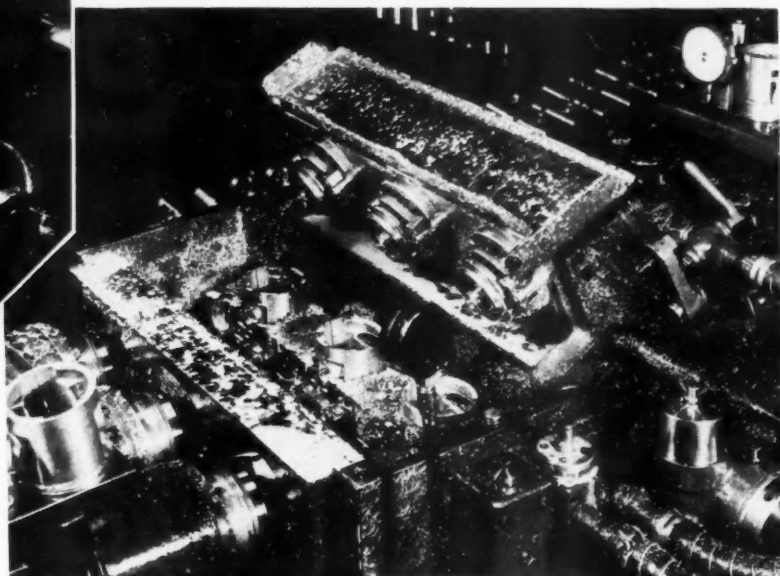
Finishing operations take place in a separate department, completely enclosed and physically separate from the initial operations. This department, including also the finish-machining of connecting rods, is maintained at a temperature of 70 deg. Fahr, and supplied with filtered air to assure freedom from dust and dirt.

Centerless grinders are employed for rough and finish cam-grinding of the outside diameter. Weighing and machining to common weight is done on a battery of special balancing machines.

(Turn to page 27, please)



Wrist pin holes in Nash pistons are diamond-bored on this Heald Bore-Matic at the right while above is a Norton grinder at the Nash plant grinding outside diameter and ring lands



## Buick Factory Piston Routing

### OPERATION

Bore, face and center open end and center closed end  
Cam turn outside diameter, form ring lands, form grooves and 5½ in. angle and chamfer ring grooves  
Drill and chamfer piston pin hole  
Drill saw slot holes and cut saw slots  
Drill oil holes in oil seal ring grooves  
Drill oil holes in pin bosses

Burr oil return holes and saw slots on inside of piston  
Recenter open end

Rough grind contour piston  
Final recenter open end

Finish grind contour of piston  
Machine for standard weight  
Anodize

### EQUIPMENT

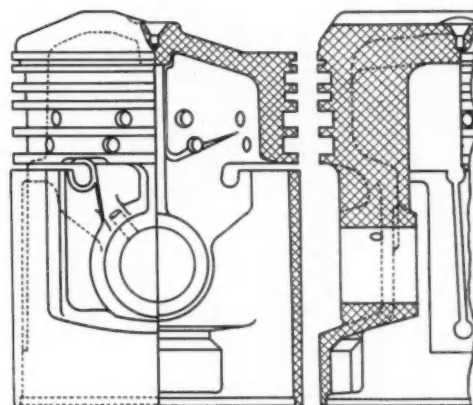
Fay automatic lathe  
12 x 21 in. Fay automatic lathe  
Kingsbury double end drilling machine  
Kingsbury special drilling and sawing machine  
Kingsbury 6-spindle drilling machine  
Kingsbury 4-spindle Type G.F. semi-automatic drill  
Cincinnati electric speed lathe  
21 in. Cincinnati drill press  
Norton plain grinder  
21 in. Cincinnati drill press  
Norton plain grinder  
Morris balancing machine  
Meaker pull automatic return type anodizing machine

### OPERATION

Diamond bore pin hole  
Inspect and mark piston and place on conveyor

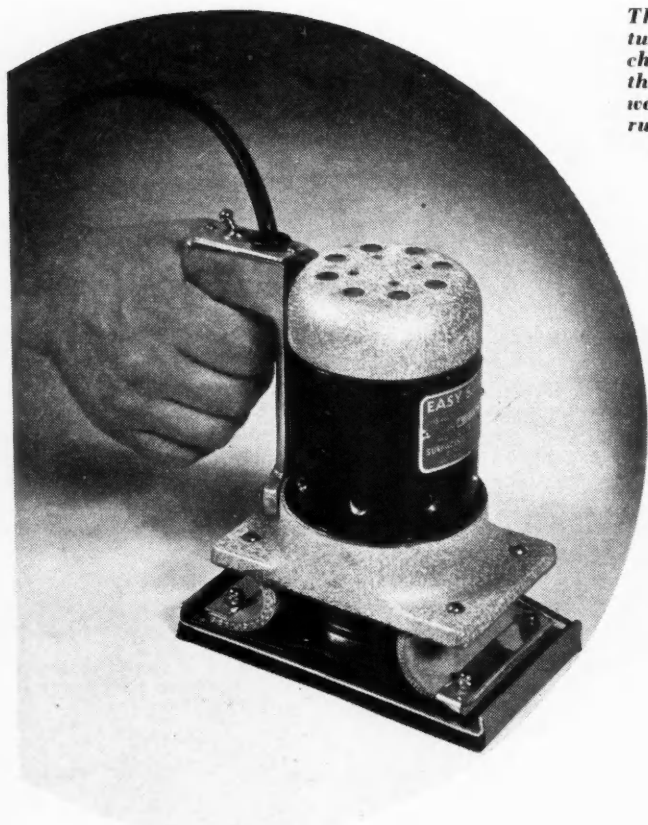
### EQUIPMENT

Ex-Cell-O diamond boring machine  
Martin marking machine  
Toledo scale

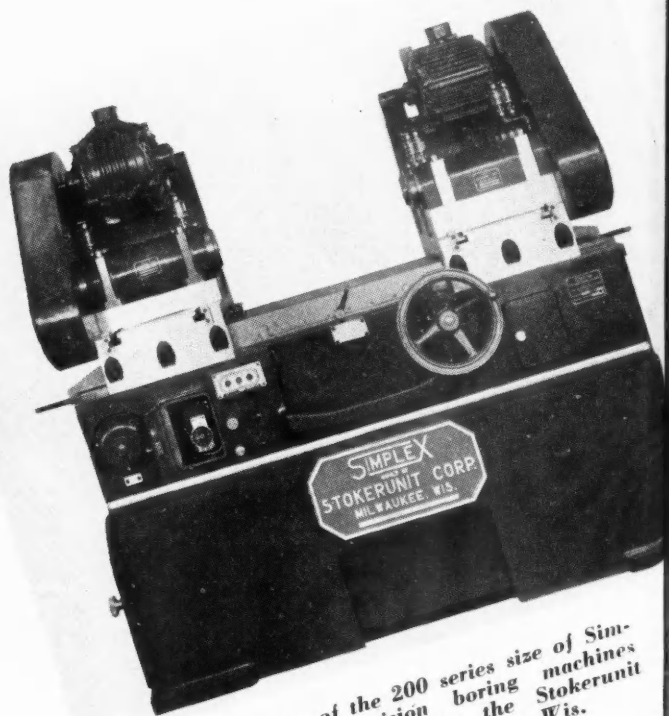


# MEN and MACHINES....

*A growing strength in domestic  
bring a note of optimism to the*



*The "Easy" electric sander manufactured by the Detroit Surfacing Machine Co. Automotive applications of the device include "feathering" spot work, removing paint, lettering or rust, scuffing, sanding undercoats, compound rubbing, and waxing.*



*One of the 200 series size of Simplex precision boring machines manufactured by the Stokerunit Corp., Milwaukee, Wis.*

**F**ORMAL announcement of a 1939 Machine Tool Show to be held in Cleveland's \$15,000,000 Public Auditorium from Oct. 4 to 13 has just been made by the National Machine Tool Builders' Association. Available exhibit space already has been oversubscribed, an impressive fact when there is a floor area of 150,000 sq. ft. devoted to display booths of exhibitors. Thousands of different machines valued at millions of dollars will be shown, and power to operate them will be provided by special lines carrying an 8500 hp. connected load.

Commenting on the Show, Wendell E. Whipp, president of the Association and president of the Monarch Machine Tool Co., Sidney, Ohio, pointed out that the four years since the previous Show held in Cleveland in 1935 "have shown substantial advances in the art of machine tool building—advances which mean reduced production costs, increased productivity per dollar invested, and greater potential profit."

"The visiting manufacturer," added Mr. Whip, "will

have ample opportunity to watch various machines in operation, to ask questions, and to determine just what tools will be most effective in solving his particular production problems.

"This year's Show is purely a business proposition. Registration fee (\$1.00) is charged mainly to insure that attendance will be confined to people who have a direct dollars-and-cents interest in better machine tool equipment. Rules governing displays have been worked out with a view toward maximum visibility and a minimum of crowding."

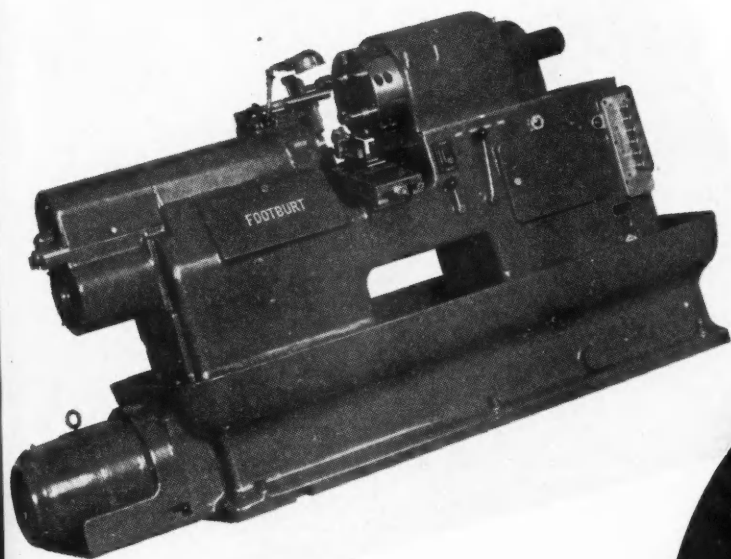
In connection with the Machine Tool Show there will be held a series of evening meetings sponsored by the Machine Tool Congress, which will be open to the people attending the Show. Organizations participat-



## **orders and a forward swing in foreign orders preparations for the '39 Machine Tool Show**

*The Foote-Burt Co.'s No. 1½ automatic single spindle screw machine.*

*(Below) One of the continuous presses in operation at the new Carboloy factory used to press Carboloy. These machines can produce several hundred shaped pieces per hour, requiring no further forming. Two 300-ton presses are also installed in the company's new plant to press rectangular ingots from which smaller, individually-shaped pieces are formed on a subsequent operation.*



ing in the Congress are the American Foundrymen's Association, Inc., American Society of Mechanical Engineers, American Society of Tool Engineers, Associated Machine Tool Dealers, Cleveland Engineering Society, National Electrical Manufacturers' Association, National Foremen's Association, National Machine Tool Builders' Association, and Society of Automotive Engineers.

Solid backing for the optimism with which the National Machine Tool Builders' Association views the forthcoming Show is the Association's report of a renewed forward swing in both domestic and foreign machine tool orders which has carried its monthly index above 200 for May, and the three months' average to 186.9. At this point the index is within the average range for 1937. Orders for foreign delivery for the first five months of this year were heavier than in 1937, and represent a larger share of the total. Further, the report



states that "The growing strength in domestic orders may be estimated from the fact that the total domestic business placed for the first five months of this year is 43 per cent above the total for the last five months of 1938."

The heavy flux of equipment announcements submitted to *Men and Machines* continues unabated. New development of the Stokerunit Corp., Milwaukee, Wis., is the 200 series size of Simplex precision boring machine, especially arranged to provide flexibility and versatility in fine boring and facing work.

On each end of the bed of this machine is mounted a substantial bridge which is adjustable to provide

from 19 to 35 in. between bridges. Alignment is maintained by one edge of the hardened way on the front side of the bed. From one to four spindles may be mounted on each bridge, and they are driven by vee belts from a rubber mounted motor pivoted for adjustment above the bridge. Normal spindle speed range is from 250 r.p.m. to 3500 r.p.m. Normal distance from spindle to table is 6 in., but can be increased as desired.

The table is 13 in. wide by 54 $\frac{3}{4}$  in. long with two tee slots and a centrally located alignment slot. Feed to the table is obtained from a gear motor driving through a set of pickoff gears for feed changes to a

(Turn to page 47, please)

## PRODUCTION LINES . . . .

### Pace Makers

No one who has lived with the automotive industry will deny that the most potent element in progress and new development is the parts industry. Many large organizations, hundreds of smaller units, specialists all, concentrate on the smaller units of a motor car or bus or industrial tractor. Specialization has created service groups best suited to undertake the burden of new developments, new ideas through engineering research. Moreover, such specialists have developed "know how" techniques not only in design but in manufacture as well, thus making feasible the substantial reductions in product costs so basic to current price trends. This great body of specialists constitute a part of the research facilities of our great industry and deserve continued support toward new heights of technical progress.

### Universal Power

Judging by a few samples, exciting history may be written by commercial engine builders within the next six months or so. One striking development is a universal type of engine that will burn any kind of fuel—gasoline, natural gas, fuel oil. Equally prominent engine builder has been working on a special induction system that will convert a conventional gasoline engine into a fuel oil burner. To cap the climax, one of the parts makers may be ready with a fuel oil burning carburetor that can be fitted to any gasoline engine, by anybody.

### E-P Lubes

As we said on another occasion, automotive men and petroleum technologists alike are agreed that the answer to the problem of lubricating hypoid gears lies in the development of what may be termed a "universal" E-P lubricant. Whether such a product is commercially practical is another matter. Several people admit they have the answer. One important and old line specialist tells us that they have developed an E-P

concentrate which can be blended with commercial lubricant to produce the desired ideal. The product is ready and awaits all and sundry trials.

### Cast Cranks

A lot of water has gone over the dam since Ford adopted a cast steel alloy crankshaft. During that time, cast cranks have been made in sizes ranging from 500 pounds to several tons in weight for large industrial and diesel engines. We note off the record that much experimental work has been done recently with cast steel alloy cranks for the smaller, automotive in-line engines. In fact, we have learned enough not be surprised if they are adopted more widely on heavy duty and even on certain passenger car engines.

### Ketteringism

Every now and then, "Boss" Kettering springs an epigram that excites the imagination by its sheer lucidity. Oft told but always refreshing is Ket's definition of the Second Law of Thermodynamics. Well do we remember how we had to define it in order to make the grade. Here's the understandable statement. "You can't push on something that's moving faster than you are." We wish some day that Ket would take a few minutes out to give a similarly succinct definition of Entropy.

### Cutting Fluids

Latest contribution to the art of metal cutting is a new bulletin—"Cutting Fluids"—issued by The Esso Marketers. It analyzes briefly the role of cutting fluids, selection of cutting fluids, methods of handling and sterilization. There is a comprehensive section describing the Esso Marketers' line of products, supplemented by a table giving general recommendations for specific metal cutting operations. The bulletin is profusely illustrated with well chosen photographs of metal removing operations using cutting fluids. Ask us for a copy if interested.—J. G.

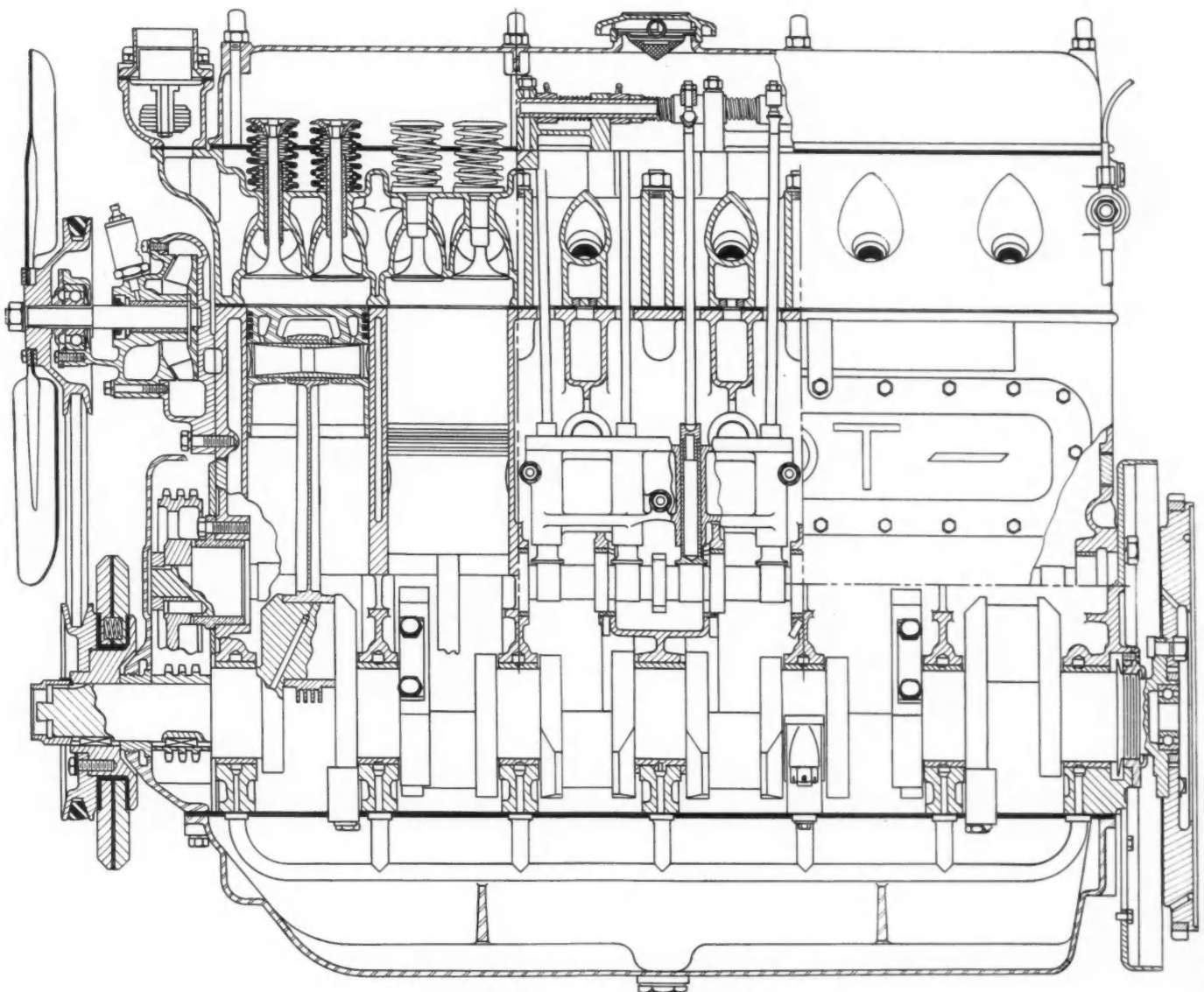
## TALBOT-DARRACQ FOUR-LITRE MASTER and LAGO SPECIAL ENGINES

### *Longitudinal Section*

**T**HE Master 4-litre is a six cylinder engine of 90 by 104.5 mm. bore and stroke (3.996 c.c.), with a seven bearing crankshaft and a cast iron head having two pushrod operated valves inclined from the vertical. Compression ratio is 6.3 to 1 and power output 105 at 4000 revolutions. A single downdraft Stromberg carbureter is used.

Derived from the "Master" is the "Lago Special" with an aluminum alloy head giving a hemispheric

combustion chamber and two inclined valves per cylinder. Operated from a single camshaft in the base chamber, the exhaust valve is actuated by a long overhead rocker and the inlet valve on the opposite side by a short rocker. Spark plug is set in the center of the head. Bronze valve seats are inserted, exhaust valves are of silchrome and triple springs are used. Compression ratio is carried up to 7.2, three downdraft Stromberg carburetors are fitted and the power output is 160



ENGINE DESIGN



## TALBOT-DARRACQ FOUR-LITRE MASTER and LAGO SPECIAL ENGINES

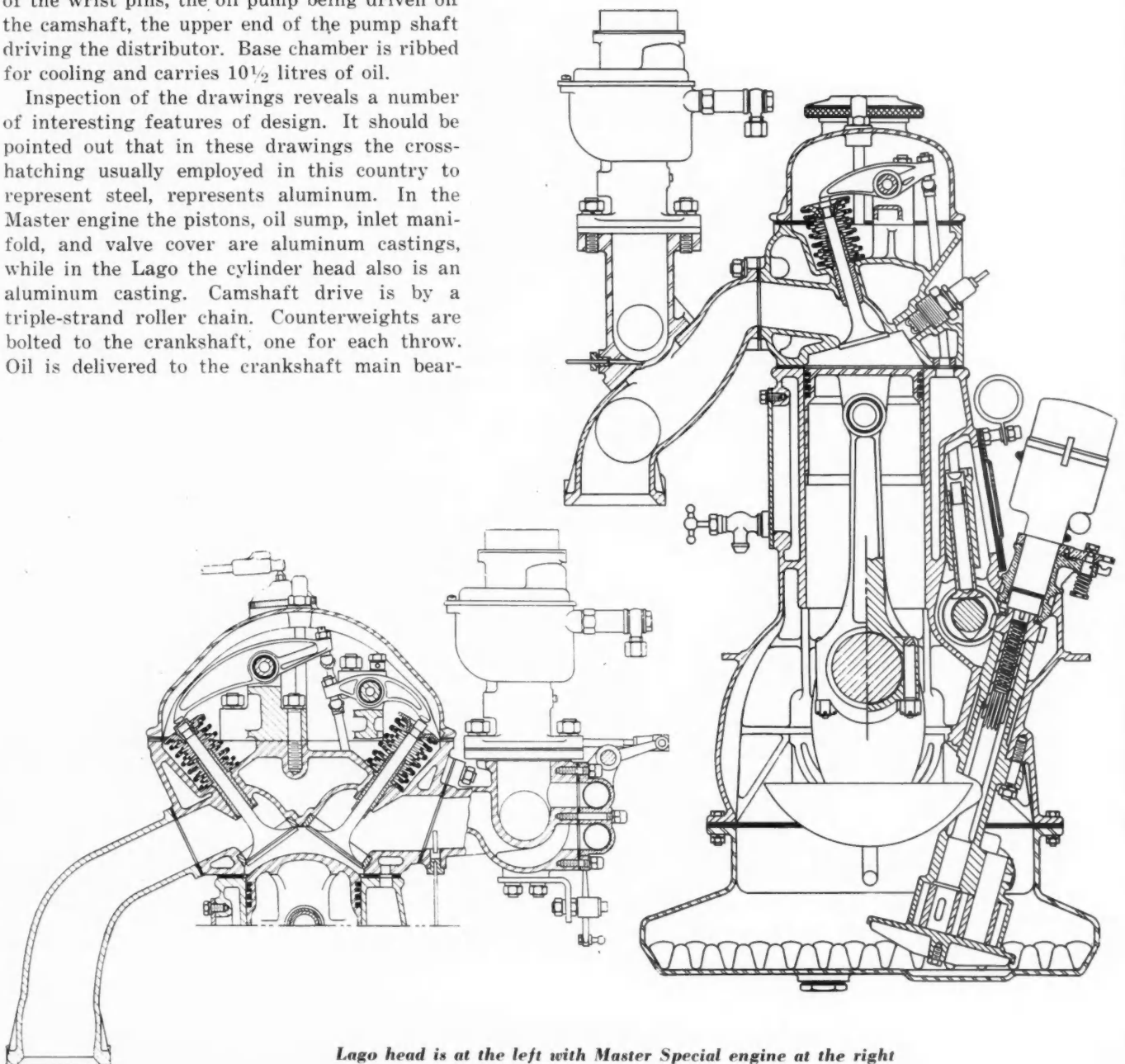
### *Transverse Section of Master Engine and of Lago Cylinder Head*

at 4200 revolutions. Cylinders have nitralloy sleeves and pistons are Debard type in R.R. alloy.

The seven bearing crankshaft is carried in steel backed white metal bearings; connecting rods have white metal bearing spun direct into the rod, the cap of which is ribbed to assist cooling. Lubrication is pressure fed throughout with the exception of the wrist pins, the oil pump being driven off the camshaft, the upper end of the pump shaft driving the distributor. Base chamber is ribbed for cooling and carries 10½ litres of oil.

Inspection of the drawings reveals a number of interesting features of design. It should be pointed out that in these drawings the cross-hatching usually employed in this country to represent steel, represents aluminum. In the Master engine the pistons, oil sump, inlet manifold, and valve cover are aluminum castings, while in the Lago the cylinder head also is an aluminum casting. Camshaft drive is by a triple-strand roller chain. Counterweights are bolted to the crankshaft, one for each throw. Oil is delivered to the crankshaft main bear-

ings through a manifold. It will be noticed that the valves have a considerably larger diameter in the aluminum head with hemispherical combustion chamber. Hot spots are provided on the inlet manifold in a simple manner, but the heat supply apparently is not controllable.



*Lago head is at the left with Master Special engine at the right*

# AUTOMOTIVE INDUSTRIES

## *Just among Ourselves*

**I**N our issue of March 25 there appeared a brief news item concerning a new aircraft engine developed in California, for which great simplicity and remarkable performance were claimed. Letters were received from a number of readers who wanted to know more about the engine, so we wrote for additional information. A reply has now been received, but unfortunately it does not add greatly to our knowledge of the engine.

We are told that the Bailey rotary motor—by which name the new prime mover seems to be known—consists of a circular case with a circular rotor inside, both turning upon a stationary shaft, the inside rotor being eccentric with relation to the outside one (the shell) and of smaller diameter. The space between the rotors is divided into six or seven chambers by vanes and sealing strips, the number depending on the size of the motor.

This is all of the information regarding the design which our correspondent has been able to obtain, and it is, of course, entirely insufficient to enable one to form an intelligent idea as to its mode of operation; nor is it of help in trying to explain the remarkable economy with which it is credited. When it was stated in the original report that the 500-hp engine consumed 8 gallons of gasoline per hour, it occurred to us that this might be a typographical error, or that it might refer to the fuel consumption of the engine when idling. However, in the latest report it is plainly stated that "the 500-hp. engine for aviation has a maximum fuel consumption of 8 gallons per hour." This claim is certainly a most remarkable one, not only because it represents a specific fuel consumption of less than 25 per cent of that of our best modern aviation engines, but because an energy output of 500 horsepower-hours is more than the total heat energy in 8 gallons of even the best gasoline. No engine, no matter how ingenious and how highly developed, could produce 500 hp. for one hour from 8 gallons of gasoline. If the engine actually developed this power it must have drawn on the store of energy of the surrounding atmosphere, which it could do only if, instead of heating up in operation, as the conventional engine does, it ran at sub-atmospheric temperatures. This would mean, of course, that the exhaust gases were at atmospheric temperature even at the ports and that no cooling system would be required, or the engine must absorb

energy from the atmosphere instead of giving it up to the surrounding air. Wouldn't that be wonderful!

### What Manner of Men?

It is pretty generally understood among American industrialists that if the United States becomes embroiled in a major war at any time in the future, the course of industry will be dictated by controls, economic and otherwise, which will make those in force during the last war seem puny indeed.

On June 20, in New York, at a luncheon of the Advertising Federation of America, Hon. Louis Johnson, the able assistant secretary of war, and Allen H. Brown, the dynamic public relations director of the Bakelite Corp., touched on the question from their respective points of view.

Said Mr. Brown: A clarification of the Government's attitude toward business in a time of future emergency would be helpful to business now.

Said Mr. Johnson: We propose that controls that affect civilian life be completely in the hands of civilians.

As a forthright, if partial, answer to Mr. Brown's statement, Mr. Johnson's was greeted with solid applause. As a statement of policy it was probably extremely important. But it left with this observer a lingering memory of the fact that the civilian "controls" on industrial activity during the past six years have left much to be desired from the standpoint of industry.

The important question to us is: What kind of people are going to be entrusted with the industrial welfare of the country in a time of national emergency? Are they to be political civilians, or academic civilians, or the kind of civilians who have proved their administrative ability in industry of peace times?

One could probably not expect to get an answer from Government sources to the question: "Have 'M' day preparations gone so far as the preparation of a panel of names from which might be drawn the 'War Industries Board' of the next emergency?"

But the character of that choice is perhaps as important to the future of the United States as the solution of any of the questions which seem more pressing at the moment. It may be the largest factor in determining whether the United States remains a Democracy.

P.M.H.—H.H.

# From France and

## High-Output Aircraft Engines

**T**HE authors of this paper, E. W. Hives and F. L. Smith of Rolls-Royce, Ltd., Derby, England, observed that they would have been better prepared to do justice to one on "High Output of Aircraft Engines," for the foremost object in Great Britain since the adoption of the Government's rearmament policy has been to increase production.

Engine output evidently can be increased by increasing the performance of cylinders of the present size, increasing the size of cylinders, and increasing the number of cylinders. Until quite recently the detonation characteristics of the fuel were the chief limitation on specific output, but with the advent of 100-octane fuel, engine designers are confronted with several new problems. There are several possible ways of increasing the b.m.e.p. obtainable with a given fuel without detonation. Apart from modification in the design of the cylinder, improvements in supercharger efficiency and the fitting of inter-coolers are the most obvious. Another possible method consists in injecting water into the charge.

Improving the efficiency of the supercharger has a twofold effect on the specific output. First there is a direct gain of shaft power, because less power is absorbed by the blower; secondly, the air passing through the blower is not heated so much, and the lower intake temperature permits of a higher b.m.e.p. without detonation.

Tests with water injection on a single-cylinder 5 by 5½-in. unit showed that the b.m.e.p. with a maximum-economy mixture at "standard detonation" (that could be just heard 20 ft. away) was increased from 122 to 189 lb. per sq. in., and the b.m.e.p. with a rich mixture was increased by water injection from 191 to 217 lb. per sq. in. However, the authors do not consider water feed practical in multi-cylinder aircraft engines. Water injection at a single point of the manifold would lead to very unequal distribution. To insure uniform distribution a complicated installation would be required, and it would be better to use special high-octane fuel for the take off.

All Rolls-Royce automobile engines are now fitted with aluminum-tin big-end bearings, and the engine of the Bentley car (a high-performance sports type) has aluminum-tin main bearings. This bearing material is now being applied to aircraft engine big-end bearings with great promise (instead of the copper-lead bearings so far used). The most satisfactory alloy

for big-end bearings contains 5.5-7.0 per cent tin, 1.4-1.7 per cent nickel, 0.1-1.0 per cent magnesium, and 0.6-0.9 per cent copper, the remainder being aluminum. For main bearings an alloy of the following composition has proven most satisfactory: 4.6-5.0 per cent tin, 1.6-2.0 per cent nickel, 0.7-0.9 per cent manganese, 0.4-0.8 per cent antimony, 0.45-0.60 per cent silicon, and 0.35-0.5 per cent magnesium. A shaft hardness of at least 600 Brinell is necessary to prevent seizure.

Exhaust-valve troubles resulting from the introduction of leaded fuels and high ratings led Rolls-Royce

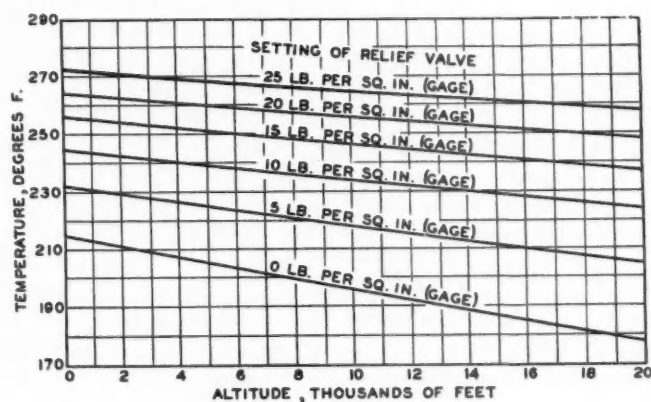


Fig. 1—Altitude boiling points of 30 per cent ethylene glycol solution.

to make an exhaustive investigation into the cause and prevention of lead attack on the valves. As a result of this investigation the following explanation of the nature of the attack was arrived at:

Lead oxide is deposited on the valve head and fuses with the protective oxide skin. It now acts as an oxygen carrier and promotes further oxidation of the valve material. The oxide mixture creeps slowly to the edge of the valve, where it is heated by exhaust scour, and if the valve seats either perfectly or very badly, it is broken up and blown out through the port, doing no further damage. If, however, the bedding is just slightly faulty, the scale is able to adhere to the valve face, and pitting occurs, until eventually a slight gas leak takes place and a gutter is formed by the joining of the pits, giving much higher local temperatures, thus hastening the flow of scale from the



# England . . .

## ***Come engineering data gleaned from papers presented at the World Automotive Engineering Congress***

head of the valve. This is the first stage of the attack. If there is now an adequate deposit of lead oxide on the head of the valve, the rise in temperature at the "blow by" can increase. The continuous supply of molten lead oxide from the head and adjacent pits in the roughened surface, carries oxygen, obtained from a partial decomposition of the exhaust gas, to the steel, which is doubly heated by the scouring and its own oxidation. A rapid "thermit" type of burning of the steel may now ensue, quickly leading to complete failure of the valve.

Rolls-Royce, following a prolonged series of tests, have standardized an exhaust valve cooled in the stem only and coated with Stellite on the face and head. All of the engines have four valves per cylinder, and the valves therefore are not very large. A material for coating the valves that is still more resistant to lead attack is an alloy composed of 80 per cent nickel and 20 per cent chromium. This can be used also for the complete valve, and the authors point out the desirability of valves made of a single material, which are immune from troubles due to differential heat expansion and to welding.

Troubles in aircraft engines, and particularly in the in-line enbloc type, arise also from changes in operating temperatures as the flight conditions are varied. Tests on liquid-cooled engines during a glide from 17,000 to 2000 ft. altitude showed the coolant inlet temperature dropped about 170 deg. Fahr. Advantage, therefore, has been taken of automobile practice, and a thermostat is now fitted in the circulating system to provide a simple and effective means of automatic temperature control. The ordinary type of thermostat was found unsuitable for the purpose, as it is sensitive to pressure variations with changes in altitude. This difficulty was overcome by introducing a pressure-compensating feature. Early experience showed that in case the thermostatic bellows collapses, a considerable portion of the

coolant is by-passed around the radiator, and the engine temperature rises in consequence. A positive automatic safety device is now incorporated, which in the event of failure of the bellows puts the by-pass out of action and causes all of the coolant to pass through the radiator.

Cooling systems for liquid-cooled engines have passed through several stages of development. Water under atmospheric pressure passed out of favor some years ago. The next step was evaporative cooling, but the complication of the system and the need for condensers were objections. Next ethylene glycol cooling at approximately atmospheric temperatures was resorted to, and this has now been replaced by water cooling under pressure. The system is similar to a normal water-cooling system with the addition of a spring-loaded double-acting relief valve in place of a vent in the header tank. A 30 per cent solution of ethylene glycol in water is recommended for year-around use. Formerly the change from pure water to this solution was made at the end of the summer to prevent freezing, but this was found to dislodge scale in the cooling system and to call for additional maintenance work. Fig. 1 shows the boiling temperatures of the 30 per cent ethylene-glycol solution for different settings of the relief valve and at different altitudes.

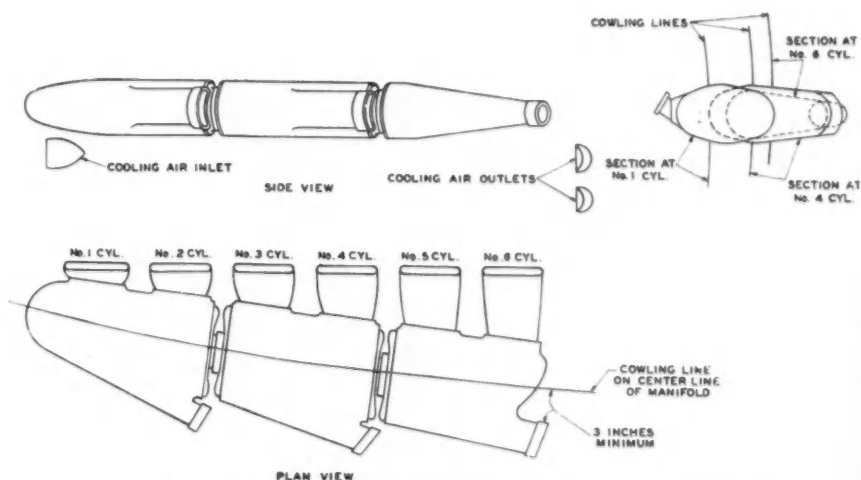


Fig. 2—Arrangement of streamlined ejector exhaust manifold.

Rolls-Royce, Ltd., have developed and patented an ejector-type exhaust system in which the exhaust gases are discharged rearwards at high velocity through restricted outlets, and their kinetic energy is utilized to give a propulsive effect which actually adds to the speed of the plane. The speed is increased not only as a result of the exhaust-moment effect, but the backward ejection of the exhaust gases at high velocity smoothes out the air flow over the body, suppressing turbulence and eliminating the interference set up when the exhaust gas is discharged at right angles to the slip stream. The ejector manifolds now being made are a development of the slotted, stream-

lined blister type previously used by Rolls-Royce, in which the gas expansion takes place in one lobe or blister coupled to each pair of cylinders, and the discharge is through a slot in the outer face of each lobe, a scheme which was found to prevent the flaming that occurred in earlier designs. In the injector manifolds (Fig. 2) the slots are replaced by a restricted outlet facing backwards at the rear of each blister. The three lobes on each bank of cylinders are inter-connected and merged into one streamline contour to reduce the drag, and expansion joints are provided between the different pairs of lobes, as shown in the illustration.

## Crankshaft Wear with Lead-Bronze Bearings

**L**EAD-BRONZE or copper-lead bearings have the advantage of eliminating the cracking of bearing linings sometimes experienced with babbitt bearings, but this is accompanied by the disadvantage that they cause appreciable journal wear, at least in some cases. The Institution of Automobile Engineers therefore undertook an investigation to determine the rates of wear with various crankshaft materials in copper-lead bearings, and a paper by C. G. Williams, H. Ludicke, both of the I.A.E. research staff, dealt with this investigation and its results.

The tests were made with a single-cylinder dummy engine in which bearing loads were produced only by inertia and centrifugal forces, the engine being driven by an electric motor and the pistons having no crown, so that these loads could be accurately calculated. The bearing temperature was maintained at the desired value by means of an electric heater and was measured by a thermo couple close to the surface. The crankshaft was rotated at 3300 r.p.m., which gave a rubbing speed in the crankpin bearing (0.89 in. diameter) of 756 ft. per min., and the piston mass was such as to produce a mean specific bearing load of 2500 lb. per sq. in. the maximum and minimum loadings being 4400 and 670 lb. per sq. in. respectively. A new bearing and crankpin were used for each test and were carefully run in for 8 to 10 hr. Each combination was run for a total time of about 100 hours, the machine being stopped and dismantled for measurement of bearing wear at intervals of about 20 hr. A mineral oil of 890 Saybolt seconds at 100 deg. F. and 82.4 Saybolt seconds at 212 deg. F. was used for lubrication. Bearings were fitted with a clearance of 0.001 to 0.0015 in. The bearing material contained between 26 and 30 per cent of lead and small amounts of tin.

Tests were made on crankpins of bar steels having the following compositions:

**Table I** Plain Carbon and Alloy Steels

Material	Hardness Un- Treated	V.P.N. Heat- Treated	Composition in per cent						
			C	Si	S	P	Mn	Ni	Cr
Ni-Cr Steel	...	260	0.38	0.24	0.025	0.025	0.53	1.3	0.59
0.5% C Steel	164	255	0.515	0.10	0.028	0.028	0.63	...	...
1.0% Ni Steel	208	...	0.365	0.23	0.037	0.035	0.80	0.74	...
Ni-Cr-Mo Steel	373	326	0.365	0.19	0.029	0.03	0.48	2.08	1.16

July 1, 1939

Automotive Industries

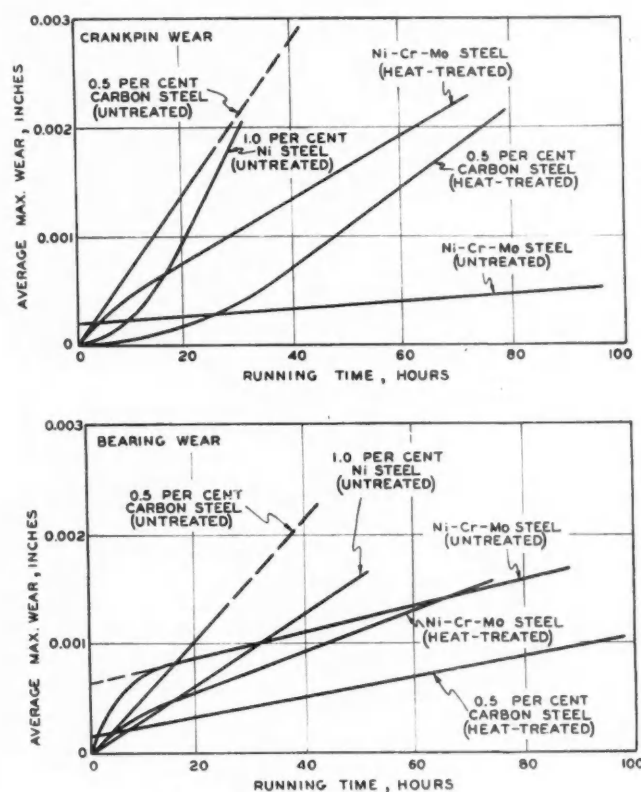


Fig. 1 and 2—Rates of wear with plain carbon and alloy-steel crankpins.

In Fig. 1 the maximum wear of the crankpin (on the side nearest the crankshaft axis) with the different materials is plotted against running time, and it will be seen that, except at the beginning, while the wearing-in process was being completed, the rate of wear was constant. The bearing wear with the different crankpin materials, measured in line with the con-

Table II  
Cast Materials

Material	Hardness V.P.N.	Composition in per cent								
		C	Si	S	P	Mn	Ni	Cr	Mo	Cu
Cast 'Alloy' .....	330	1.2	1.76	....	....	0.47	0.03	0.55	...	2.58
Cast Steel .....	276	0.3	0.2	0.038	0.035	0.80	2.47	0.42	0.35	...
Cast Iron .....	270	2.94	1.3	0.14	0.12	0.95	...	...	0.33	1.2

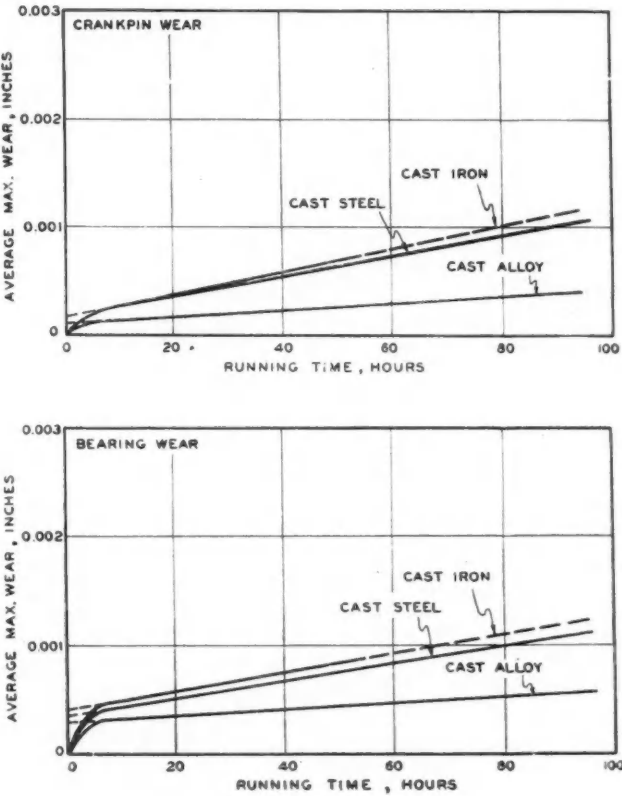


Fig. 3 and 4—Rates of wear of crankpins of cast materials.

necting-rod axis, is shown in Fig. 2. It will be seen that by heat-treating the 0.50 per cent carbon steel so as to increase its Vickers hardness from 164 to 255, the crankpin wear was practically halved and the bearing wear reduced in the ratio of 5:1. An untreated 1.00 per cent nickel steel having a Vickers hardness of 208 had the same high rate of wear as the untreated 0.50 per cent carbon steel, and tests of these two materials were discontinued after short runs.

Wear tests were made also on three cast materials whose compositions are given in Table II. Of these three materials the "cast alloy" is used for crankshafts by a large firm, the "cast steel" was used for crankshafts by another firm, while the "cast iron" is now being used to a limited extent for crankshafts by at least two firms.

From the wear-test results plotted in Figs. 3 and 4 it will be seen that the "cast alloy" gave the best performance with respect to both crankpin and bearing wear. Neglecting the wearing-in period, the rate of wear of both crankpin and bearing was about three times as great with the cast steel as with the "cast alloy." The crankpin of cast iron broke after a running-in period of 55 hr., but the measurements indicated that the rate of wear was similar to that with cast steel.

Wear results obtained with three chromium-plated crankpins are given in Figs. 5 and 6. Crankpin A was plated by one firm, while crankpins B and C were plated by another. The first was ground, while the other two were tested as plated. Deposit thicknesses on the three crankpins were 0.0025, 0.0010 and 0.0022 in. respectively; scratch hardnesses, 0.028, 0.029 and 0.027, and V.P.H. hardnesses, 867, 498, and 820 respectively. The rate of wear was practically twice as great with the thick as with the thin deposit. In order to compare the rate of wear of the plated crankpins with that of a crankshaft steel, the results obtained with the nickel-chromium steel crankpin are plotted in Fig. 5, which indicates little advantage in chromium plating for crankpins.

Fig. 6 shows that bearing wear is comparatively rapid at first, which is probably accounted for by the completion of the running-in or polishing of the crankpin. This was especially marked with crankpin B and is undoubtedly related to the initial surface finish of the pin. Bearing wear with the chromium-plated crankpins is substantially the same as with the unplated pins.

Further wear tests were made with pins of surface-hardened materials viz., a carburized crankpin with a

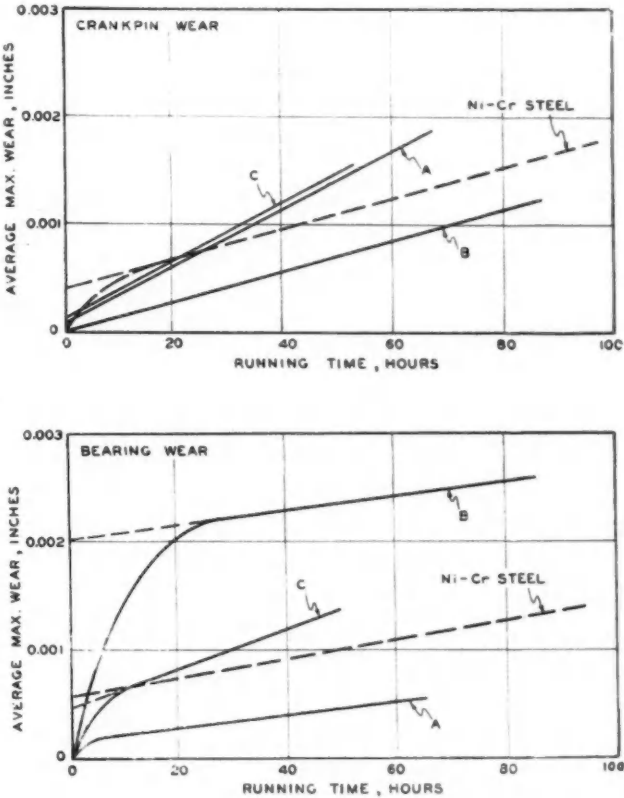


Fig. 5 and 6—Rates of wear with chromium-plated crankpins.





Vickers hardness of 886; a nitrided crankpin with a Vickers hardness of 1150, and a crankpin hardened by a proprietary process to a Vickers hardness of 746. For the latter process it is claimed that the outer surface of the material is converted into a ferrous alloy containing aluminum, silicon, and chromium. With the nitrided crankpin wear of both the crankpin and bearing was very low. With the carburized crankpin the crankpin wear was of the same order as with the nitrided crankpin, while the bearing wear was quite rapid in the initial stages and later dropped, but still was about three times as large as with the nitrided crankpin. There was no doubt that the nitrided pin had a superior surface finish. With the crankpin hardened by the proprietary process the bearing wear was very low on the whole and the total crankpin wear amounted to only 0.0006 in. in 200 hrs.

The results of these tests, which are summarized in Fig. 7, show that case hardening is a satisfactory means of reducing crankpin wear with copper-lead bearings. Compared with a nickel-chromium steel, the wear with the three case-hardening processes was about one-fourth. Bearings generally showed a high initial rate of wear, and their rate of wear was higher than that of the crankpin, which is contrary to what occurs with crankpins of softer materials. It is highly probable that with hardened crankpins the rate of bearing wear is largely dependent on the surface finish of the crankpins. The crankpins used in the tests

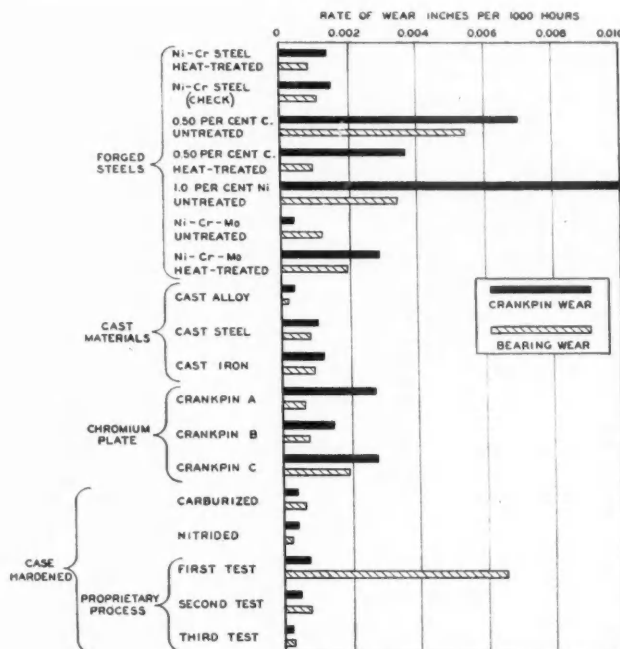


Fig. 7—Summary of test results on rates of wear.

were ground to a fine finish, but the finish could have been improved by lapping.

## Frameless Passenger Car Models

**F**RAMELESS passenger cars, while fairly common in Europe, are not being produced in this country to any extent as yet, and the reason for this difference, in the opinion of W. D. Appel of General Motors Overseas Operations, is that our manufacturers, on account of their enormous annual productions and their large investment in plant, equipment and tools, have to be very cautious with respect to radical practices which if adapted might bring on difficulties in manufacturing processes or result in an unfavorable reaction of the buying public. In discussing the subject of "Some Aspects of Frameless Car Design," Mr. Appel made it clear that he had no axe to grind, as his firm produces both the conventional and frame-

less cars in large numbers, the latter in its European plants. He compared the frameless car with the conventional type from many standpoints and summed up his conclusions substantially as follows:

The frameless cars are about 2 per cent lighter, cost less by slightly more than 2 per cent, and are definitely more rigid. The frameless construction is necessary to obtain the lowest floor height; the cars cost no more to service, are just as quiet on the road, and do not involve any higher insurance rates than conventional cars. "With these facts before us," concluded Mr. Appel, "it appears to be inevitable that sooner or later a great army of our volume-produced cars will come to this construction."

## Modern European Light Cars

**M**ODERN European light cars were discussed in a paper by J. Andreau, consulting engineer and chairman of the Committee on Economic Studies of the French Society of Automobile Engineers. He pointed out some of the differences between the conditions affecting the passenger-car market in this country and France, asserting that in most European countries the tax collector has been the "chief engineer." France, fortunately, got rid of the displacement tax some time ago, but little was gained thereby, as new taxes were introduced which add to the running costs.

To expand the market, both the first cost and the running cost must be lowered. Running costs can be reduced by modifying the design of cars so as to reduce air resistance and rolling resistance. The first means streamlining, while the second can be achieved by the use of higher inflation pressures in the tires combined with improved suspension. The author in this connection referred to an experimental car seating four to five passengers which on Monthlery track showed a fuel mileage of 53 at 30 m.p.h., 49 at 50 m.p.h. and 39 at 70 m.p.h. and a maximum speed of 93.5 m.p.h.

# Monthly Production Feature

(Continued from page 15)

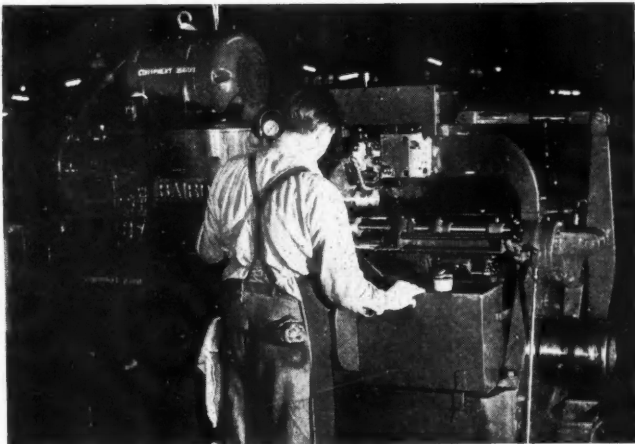
One of the unique features of the line is the adoption of Superfinish for the outside diameter, prior to anodizing, using a special six-lane piston honing machine. Another interesting feature to be found here is the use of temperature control tunnels used to reduce the temperature of the work, after hot washing, to the standard temperature of 70 deg. Fahr.

Pistons are graded according to following schedule:

Grade	Diameter A	Diameter B — $\pm 0.001$
A	3.1245	3.1131
B	3.1250	3.1136
C	3.1255	3.1141
D	3.1260	3.1146
E	3.1265	3.1151

## Studebaker

This organization is particularly proud of the new machine shop facilities recently developed for the production of The Champion, described in *AUTOMOTIVE INDUSTRIES* April 1. The piston is of nominal 3.000 in. bore size, made of Lynite, tinplated by immersion 3 to 5 minutes. The piston is heat treated before ma-



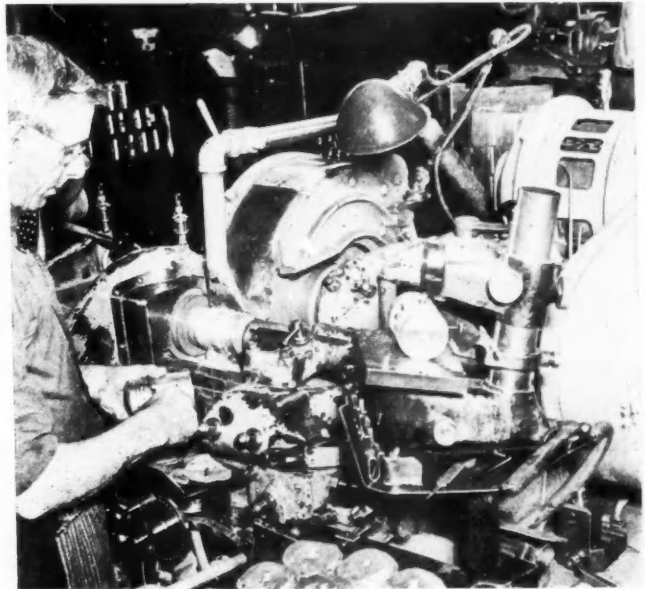
Latest edition of the Baird six-spindle chucking machine installed at Studebaker, rough turning and facing, turning ring lands

chining to develop a minimum tensile strength of 30,000 psi, Brinell hardness ranging from 90-120.

The finished parts are balanced and weighed on a special Morris machine and are held within maximum variation of weight of 2 grams.

Equipment of advanced type is found on the machine line as will be evident by inspection of the routing. Here is one of the large Baird chucking machines for turning, grooving, and facing operations; special Krueger sensitive drilling machines for the smoke holes and saw slot holes, including the sawing of the slots; LeBlond lathes for finishing ring grooves. Finish cam grinding is produced on Norton grinders.

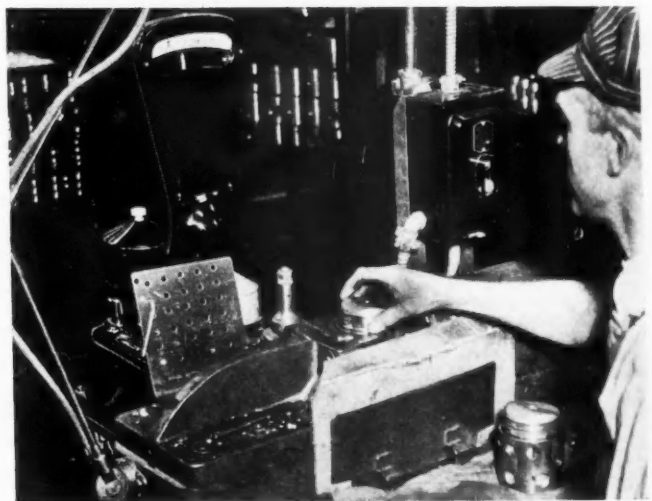
In a temperature controlled room, pistons are 100



Finish-grinding piston contour is done on a Norton grinder at Buick

per cent inspected, sized, and piston pins fitted. They are graded for size on an indicating fixture in steps of 0.0005 in. and stamped on top with a letter indicating size.

The cylinder bore likewise is indicated and stamped for size. The predetermined clearance desired between piston and cylinder is taken into account, thus a piston stamped with a letter "O" would fit approximately into a piston bore in cylinder marked "C". The final fit, however, is by means of a feeler gage fastened to a hand scale. Piston is fitted to cylinder with 16 to 22 lb. pull, using a 0.002 in. feeler gage 1 in. wide.

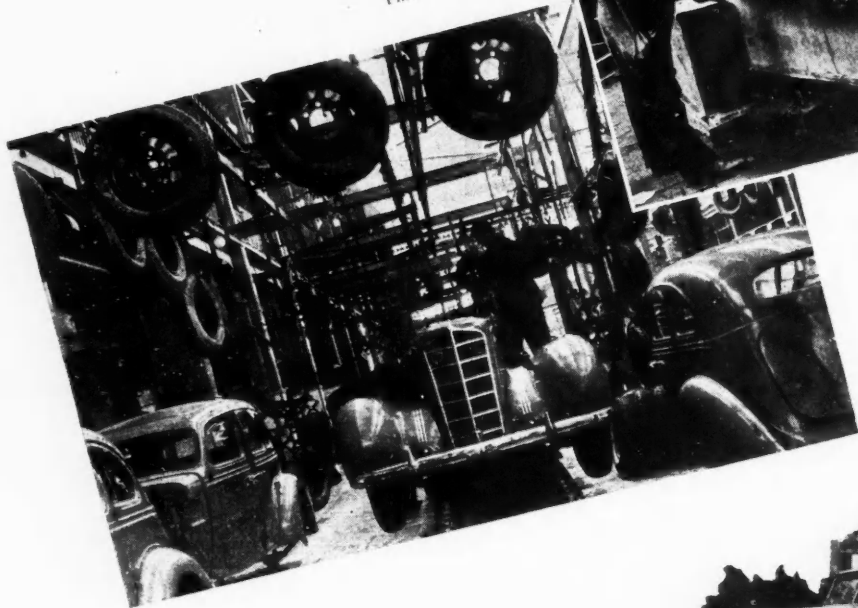


Buick pistons are machined to common weight on Morris balancing machines, one of which is shown here

# Russian Production

At the right is a view of the automobile plant in Gorky showing the installation of the rear axle.

Photos from Sovfoto

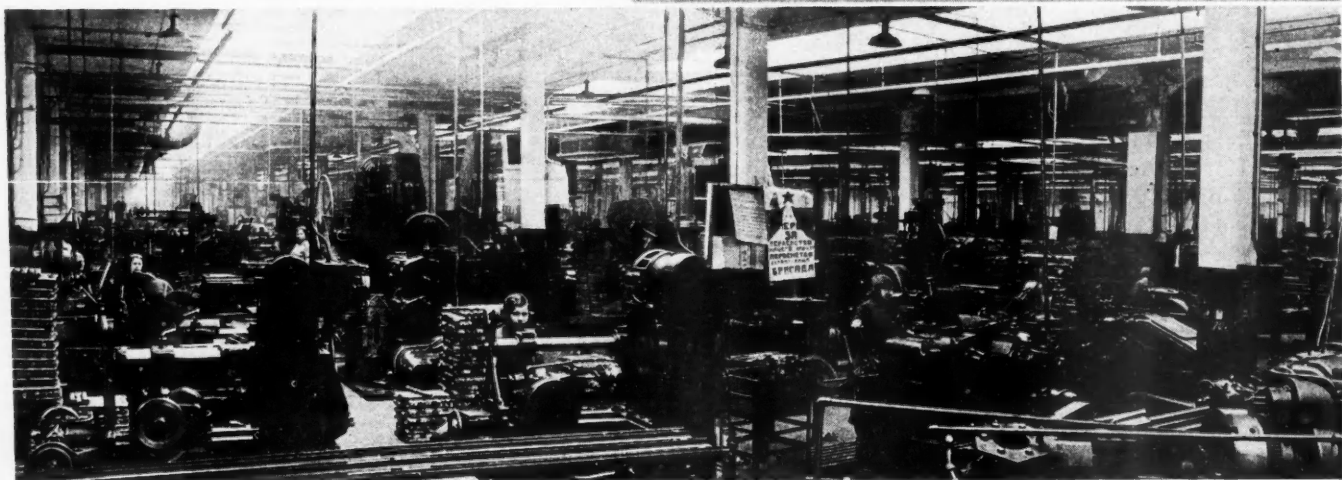
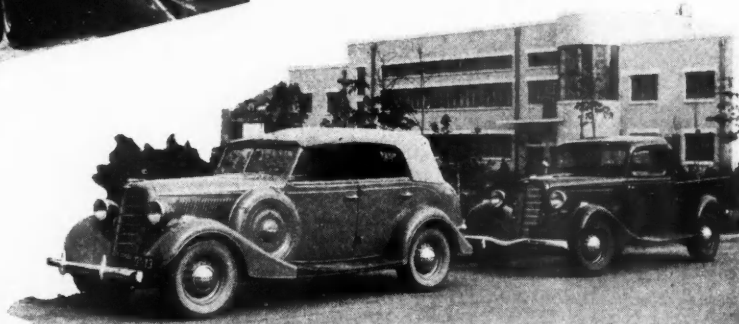


Mechanical assembly shop at the Stalin plant in Moscow where many of the skilled machinists are women.



The production line of the plant at Moscow turns out over 200 cars and trucks per day. The illustration at the left shows the main conveyor for the "ZIS-101" cars.

Directly below is shown a "GAZ 11-40" five passenger phaeton and a "Pick-up" model in front of the experimental shop of the Molotov plant in Gorky.





## NEWS OF THE INDUSTRY

### Australia Is "Determined" to Establish Automobile Industry

#### Armco Opens Mill for Production Of Sheet Steel for Auto Bodies

Despite what appeared to be either lack of interest in or lack of equipment and resources for government aided establishment of a domestic car industry by Australian manufacturers (See *Automotive Industries*, issue of June 15, p. 726) the Australian Government seems determined that the country shall stand on its own feet in automobile production. The office of the American Trade Commissioner in Sydney recently reported to the Department of Commerce an announcement by Prime Minister Menzies in the House of Representatives. The announcement was to the effect that the Ministry had definitely decided that the motor vehicle industry should be established in Australia without delay.

Reasons for the determination to establish the industry were given as: defense preparedness, industrial expansion, conservation of overseas funds, immigration and employment, and utilization of Australian raw materials. The Government would insist, it was said, that no single company would receive a monopoly, that the manufacturing company must be Australian in

character and policy, and that car prices must be reasonable.

Proposals under consideration were said to be (a) a company with all-Australian capital, or (b) a company with Australian capital in combination with capital of an overseas manufacturing company organization—respective proportions to be determined later by the Government. In a more recent interview, the Prime Minister explained that these proposals merely indicated the broad line on which the Government was working and not that there were any specific plans before the Cabinet.

(Turn to page 33, please)

#### Fansteel Sales Increase

Net sales of Fansteel Metallurgical Corp. for the first five months of 1939 were 92.2 per cent in excess of net sales for the corresponding period of 1938. Net earnings after all charges, including taxes, for the first five months of 1939 amounted to approximately \$76,000, or 30 cents per share, as compared with a loss of \$14,242.60 for the same period of 1938.



Acme

#### Medal for Henry Ford

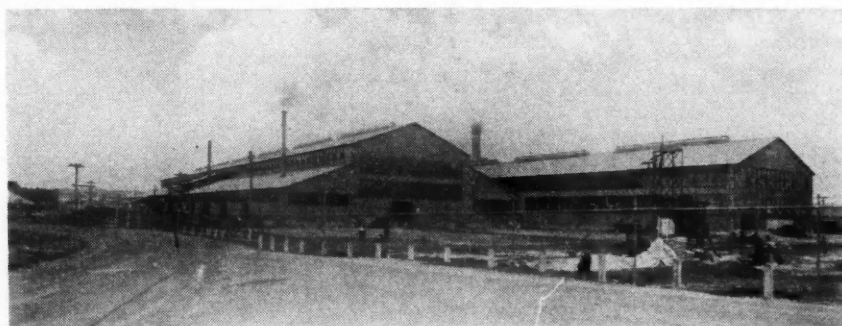
The Watt International Medal recently awarded to Henry Ford is examined by Joseph P. Kennedy, American Ambassador to the Court of St. James, and E. Bruce Hall, president of the Institution of Mechanical Engineers, who attended the presentation ceremonies held in London, England.

#### Vehicle Air Conditioning Patents Assigned to Houde

Two inventions for air conditioning the interiors of automobiles were recently patented and assigned to the Houde Engineering Corp., Buffalo, N. Y. One was developed by Hal W. McPherson and H. L. Chisholm and utilizes a refrigeration evaporator unit mounted in the driver's compartment. The other invention, patented by Ralph F. Peo, vice-president of Houde Engineering, involves a dry air-conditioning unit. The latter is described as a standardized automobile air conditioner to be mounted on the roof of a closed automobile.

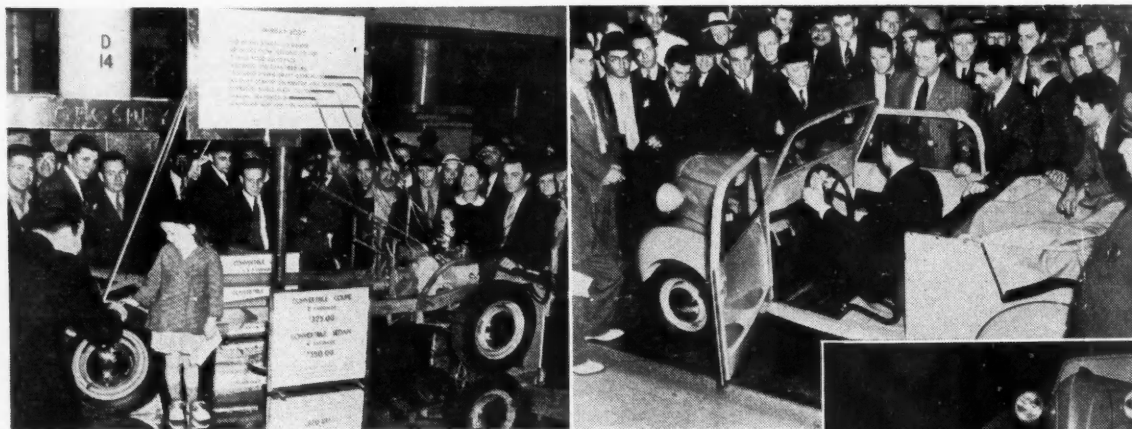
#### New Factory for Fedders

The Fedders Mfg. Co., Inc., of Buffalo, N. Y., has started construction of a \$200,000 branch factory at Owosso, Mich., where it will manufacture car heaters and tubular radiators. The new plant will not result in any changes in operation of the company's Buffalo plant, which will continue to produce refrigeration equipment and automobile radiators of the cellular type.



#### Armco Australian Rolling Mill

A joint venture of American Rolling Mill Co. and Lysaghts, of England, this new mill at Port Kembla, N.S.W., is producing silver finish auto body sheets. The \$2,900,000 mill began producing just one year and ten days after laying of its foundation. (See news story on this page)



## Crosley Car Placed on Sale in New York Department Store

*Twelve Sales Made Within Two Hours After Cars Were First Displayed at R. H. Macy & Co.*

For the first time in more than 30 years New Yorkers went shopping for automobiles in a department store on June 19. R. H. Macy & Co. exhibited the new Crosley car in one of its Broadway windows, had another car displayed on the main floor of the store, and a car and a stripped chassis were on display in the basement.

Priced at \$365 for the 2-passenger convertible coupe, and \$389 for the 4-passenger convertible sedan, plus the 2 per cent municipal sales tax for New York City residents, the cars attracted a great deal of attention, and 12 were sold during the first two hours they were on display.

So large were the crowds that ropes had to be stretched around the basement displays to hold back the curious onlookers.

Financing was arranged for at a desk nearby which was presided over by representatives of Commercial Investment Trust. No trade-ins were considered. Those who wanted a demonstration were taken by a Macy salesman in a taxicab to the warehouse of Crosley Distributing Co., a dozen blocks away, where J. J. Mack, the company's service manager had detailed two of his young women employees to give the demonstrations.

The car is also being sold by L. Bamberger, Newark, N. J., department store, owned by Macy's. In Newark the local distributor will service the cars sold by Bamberger's.

Veteran automobile dealers can recall only one instance of a New York department store taking an automobile agency. Soon after the turn of the century, Spencer Trask, banker, Barkley Warburton, a relative of the Wanamakers, and John Wanamaker were interested in the Searchmont automobile,

manufactured in Chester, Pa. The car was displayed in the Wanamaker store, as were several models of the Rambler single-cylinder, and a two-cylinder Ford.

Most of the Wanamaker automobile business was handled in a garage on Fifty-seventh Street, however, but the prestige of the famous department store was counted upon for some of the sales. Storing and servicing the cars soon became a considerable problem, and since a good deal of the motoring was done on Sundays, Mr. Wanamaker withdrew—feeling that the Sabbath was being violated and not wanting to be bothered with the servicing of the vehicles. In 1903 the store was made a co-defendant with Henry Ford in the Selden patent case.

Arthur Newton, a founder of Glidden Buick Co., recalled the problems of running a sales and service station in the converted barn on Fifty-seventh Street. He had been agent for the Woods Motor Vehicle Co. and was asked to handle the Wanamaker business. This he did until he joined Pope-Hartford Co., and soon thereafter organized the Glidden concern. The Buick agency is still in the building which was built by Pope-Hartford interests.

Macy's has ordered 100 cars to be delivered during the next 30 days. Ten are shipped in a standard railroad box car.

### \$2,500,000 Building Plan Cleveland Graphite Bronze

Directors of the Cleveland Graphite Bronze Co. are reported to have authorized purchase of the former Great Lakes Airport at Cleveland for a \$2,500,000 building program.



Wide World, courtesy R. H. Macy, Inc.

(Top left) A stripped chassis was displayed on a silvery platform. The use of standard parts was emphasized by the sign and by salesmen.

(Top right) Crowds milled around the Crosley convertible sedan in the Macy basement, where 12 cars were sold in two hours.

(Extreme right) Perched above the main floor entrance to the basement store was a Crosley convertible sedan.

### New Honing Company Formed in Detroit

A new corporation covering the field of honing tools and machinery has been organized under the name of the Honing Equipment Corp., with headquarters at 4612 Woodward Ave., Detroit. J. A. Carlin, who is president of the new company has been identified with the engineering profession for many years. In 1931 he was vice-president and general manager of the Hutto Engineering Co. In 1935, when the Carborundum Co. took over the business and made it a division of its organization, Mr. Carlin was retained as general manager of the new division.

C. E. Floss, vice-president of the new company and in charge of engineering, was one of the organizers and engineers of the Jeschke Tool Corp., which later became the Micromatic Hone Corp.

A line of standard honing machines and tools of various sizes and models has been developed to handle the finishing of a large variety of parts. Also, an engineering service for special honing problems on all types of surfaces is available, covering both tools and machines.

# Steel Producers Hope for Firmer Tone of Market by Mid-September

**No Real Step-Up in Orders by Car Parts Makers Expected Until August**

What little buying of semi-finished steel by non-integrated rolling mills has been noted since the leveling of sheet prices, has been at prices that reflect the situation in the market for finished sheets. Sheet bars have recently passed into the hands of non-integrated mills at \$2 to \$4 below former prices, giving the latter that much more of a conversion margin and permitting them to continue as auxiliary sources of supply. This indicates that the hubbub caused by the buying of sheets by automobile manufacturers, at prices severely criticized by some steel producers as inadequate, is giving way to an orderly revamping of the market's price structure on a basis somewhere between the most extreme of the recent price concession and previously current quotations, which meant little because they failed to bring out demand. While the third quarter of the year will be largely given over to the rolling of steel bought in May, many of the steel producers entertain the hope that by mid-September improved demand will make for a firmer tone of the market. While specifications against sheet contracts are coming through at somewhat more satisfactory a pace, receipt of specifications for strip steel, both hot and cold rolled, is the cause of much complaining, some of the mills having a hard time to main-

tain operations at even so low a rate as 35 per cent. Parts makers are expected to specify more freely in July, but no worth while stepping up in the demand for shipments is looked for until August. The rate of employed ingot capacity, reported by the American Iron & Steel Institute at 55 per cent for the week ending June 24, denotes an increase of approximately 4 per cent over the preceding week. The general expectation is that, following the Fourth of July holiday interruption, operations will be resumed on about the same level as at present.

While the action of the International Tin Committee in raising the third quarter export quota from 40 per cent to 45 per cent had been anticipated, there is much dissatisfaction with the ruling. Under it the producing countries will be allowed to ship during the next three months approximately 24,000 tons. United States consumption alone is estimated at around 15,000 tons for the quarter, with the rest of the world wanting probably twice that tonnage. Bolivia is expected to export around 5000 tons, but recent developments in that country have made it doubtful whether it will for long retain its membership in the International Tin Control Scheme. Malayan production can, of course, be augmented to a point where Bolivia's with-



Acme

## Kettering Honored

General Motors' C. F. Kettering (right) receives an honorary Doctor of Science degree from Ernest Martin Hopkins, president of Dartmouth College, at the recent Dartmouth commencement at Hanover, N. H.

drawal would become a negligible factor. In 1937, the Malayan output was more than 75,000 tons. This, with the full output of the Dutch East Indies, some 35,000 tons, would go far toward meeting the requirements of the United States, Great Britain and France if Germany and Italy should obtain all Bolivian tin ore through barter transactions. Dislocation of the market might result for a time, but in the long run Bolivia would lose all her cash customers. The International Tin Committee's motive, in not making a greater tonnage available to consumers at this time, is thought to have been its desire to liquidate its pool holdings before augmenting supplies.

Copper turned firm on better foreign demand. The producers' price of 10 cents for spot electrolytic could be shaded only \$1 a ton in the open market.—W. C. H.

## Major Gardner Sets New Speed Records

New speed records for the 1100 and 1500 c.c. classes were established by Maj. A. G. T. Gardner with a British M.G. car on the Autobahn records course near Dessau, Germany, on May 31 and June 2. The six-cylinder engine of the car originally had a displacement of 1086 c.c. and thus the car came into the 1100 c.c. class. It made the flying kilometer at a mean speed of 203.54 m.p.h., the flying mile at a mean speed of 203.16 m.p.h. and the flying 5 km. at a mean speed of 197.54 m.p.h. The cylinders were then bored out to increase the displacement to 1106 c.c. and with this enlarged engine the following records were established on June 2: Flying kilometer, 204.28 m.p.h.; flying mile, 203.85 m.p.h.; flying 5 km., 200.62 m.p.h. All speeds given are the mean of speeds attained in runs in opposite directions. The highest speed attained by Major Gardner in one direction was 207.37 m.p.h. These are remarkable speeds for a car of only 66 cu. in. displacement.

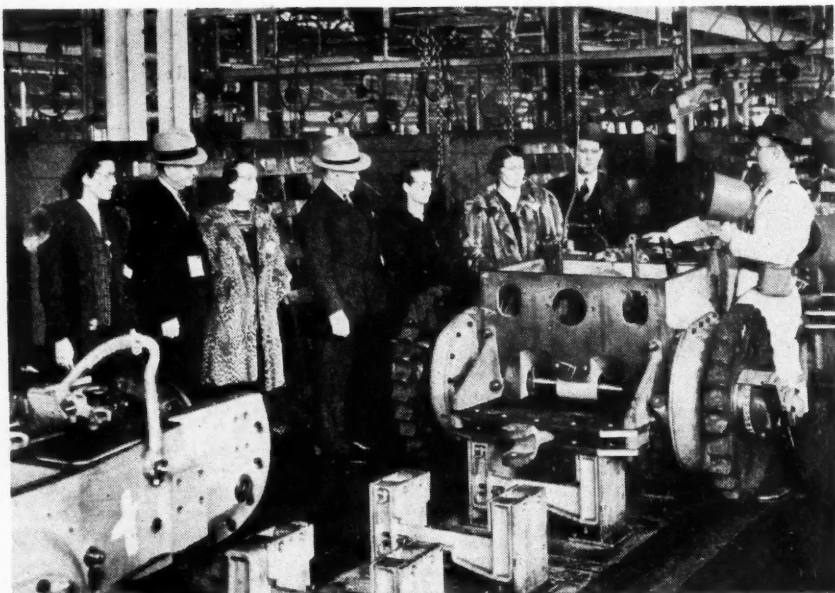


Acme

## "People's Car" Factory Nears Completion

At the end of a year of construction work, the "People's Car" factory at Fallersleben, Germany, is nearly completed and will soon be put into operation by the German government. The extensive structure is said to be the world's largest automobile plant.





### Portable Amplifiers for Plant Guides

Each guide in the Caterpillar Tractor Co. plant in Peoria, Ill., is now equipped with portable amplifiers which make his voice easily audible above the din of factory noises to all members of his party of visitors. The idea was conceived by one of the Caterpillar guides, and the equipment is now manufactured by Hindert Radio & Sound Co., Peoria, Ill. During the first three months of 1939, 6381 visitors from 38 states and six foreign countries visited the Caterpillar factory on regular and special inspection tours.

## Car Rental Plan for Railroad Passengers

### Ford Dealer in Lincoln, Neb., Pushes Plan Scheduled for Full Operation Jan. 1, 1940

Ed M. O'Shea, personable Irishman, and for the past 16 years Ford dealer in Lincoln, Neb., had an idea several years ago. At first the simplicity of it kept him from actively trying it. Last January he decided to find out whether it had the merit he believed it possessed, and as a result the Railroad Extension Service of Lincoln was born.

In a nutshell, the company proposes to offer an automobile leasing service beginning Jan. 1, 1940, to railroad passengers from the Great Lakes to the west coast and from Texas to Canada in nearly 400 cities of 10,000 population or over.

The railroads see in the service an opportunity to recapture a fair-sized slice of the traffic they have lost in recent years. The plan will be placed primarily at the disposal of principal patrons of the roads in larger cities.

Mr. O'Shea, now 42, estimates that probably 10,000 to 20,000 low-priced cars will be required to set the car-leasing system in operation.

Associated with Mr. O'Shea in the company will be Mr. Richard Rogers, his partner in the Ford agency in Lincoln and F. A. Taftest will serve as secretary-treasurer of the concern. Mr.

O'Shea said he did not care to disclose how the financing arrangements for the purchase of such a large number of cars would be handled.

"I don't want to discuss that phase of it yet," he said.

Discussing the working of the plan, he pointed out that a salesman for a Chicago company, planning a trip to Lincoln and needing a car here to make several short trips to nearby towns which he couldn't make quickly or conveniently by train connections, could arrange for an automobile the same as he does for a Pullman ticket. There will be office spaces for the service in all railroad stations and a uniformed attendant will meet those buying the service at the station with keys to the leased car. The automobile will carry no identifying signs or insignia. A number of different rental systems as to rates are contemplated, depending upon usage.

Railroads which have agreed to take the service are: Burlington, Chicago and Northwestern, Chicago and Eastern Illinois, Illinois Central, Missouri-Kansas-Texas, Missouri Pacific, Union Pacific and Chicago, St. Paul, Minneapolis and Omaha.

Since last January Mr. O'Shea has

spent much of his time in Chicago and Detroit working out the plans with railroad and automobile officials.

Under the present setup, the Railroad Extension Service agrees to furnish adequate rental service to meet all "normal and reasonable demands." The railroad traveler is to have first call on the equipment. The railroads agree to advertise and promote the service, supply the leasing company with office space in each station, assist in handling of funds and provide parking space along with telegraphing ahead any passenger's request for an automobile.

The leasing plan is aimed primarily to recapture traffic lost to the highways, especially traveling salesmen covering a territory embracing large towns along the railroad.

Car rentals include provisions for insurance of the lessee for property damage, public liability, fire, theft and collision. The daily rate is to be 8 cents a mile with a minimum of 75 miles in 12 hours. The weekly basis gives an 8-cent a mile rate with 350 miles minimum with graduated scales for lower mileage. The hourly rate is also 8 cents a mile with a minimum of 10 miles.

Cars will be available to railroad passengers upon a deposit of \$20 at the rental agency, although individuals and firms may obtain identification cards through railroad or personal references. The railroads share in none of the profits, nor will they get a commission. Mr. O'Shea and his associates, in return, are not asking the railroads to help finance the project.

Returning recently from Detroit and Chicago, Mr. O'Shea would not comment on a report that the Rock Island had also signed for the service. Nor would he add anything to the report that business and airplane services are planning to adopt this same system, as suggested in the *Chicago Daily News*.

### N.S.P.A. Sales Index for May Tops April by 3%

Automotive sales for May, according to the sales index of the National Standard Parts Association, were three per cent ahead of April and 19 per cent ahead of May last year. Average monthly sales for the first five months registered 141 which is 25 per cent above the same period of last year.

Replacement parts shipped to wholesalers in May advanced seven per cent to 148. This is 21 per cent ahead of last May. The monthly average for five months was 23 per cent above the first five months of 1938. Shop equipment and tools shipped to wholesalers in May declined one point, but the N.S.P.A. *Red Top Bulletin* points out that this is still 13 per cent ahead of May a year ago. The five months' average registered 140 which is 12 per cent ahead of the same period last year.

Original equipment shipped to vehicle manufacturers in May dropped three

per cent below April, but topped last May by 29 per cent. Monthly average for the first five months was 179, or 56 per cent ahead of last year. Export shipments for May advanced two per cent to 132. This is six per cent ahead of May a year ago. Average for the first five months was 126, or 18 per cent ahead of the same period for last year.

## MEWA Board Appoints Convention Committee

At a recent Board of Directors meeting of the Motor and Equipment Wholesalers Association held in Chicago, the following members of the Association were appointed to serve on the 1939 M.E.W.A. Convention Program Committee: George H. Niekamp, Beck & Corbitt Co., St. Louis, Mo.; W. P. Sone-son, S & S Auto-Parts Co., Duluth, Minn.; Paul G. Woolwine, W.S.D. Co., Dodge City, Kans.; Emory R. Young, Motor Car Supply Co., Charleston, W. Va.; and E. M. Deeter, E. Mather Co., Harrisburg, Pa. Mr. Niekamp has been selected as chairman.

## Monarch Open House

The Monarch Machine Tool Co., Sidney, Ohio, celebrated completion of its new factory and office building with a two-day open house on June 24 and 25.

## Bondall Co. Activities Now Directed by Inland

Inland Mfg. Division of General Motors Corp. has acquired the assets and business of the Bondall Co., St. Louis, Mo. The transaction did not include the assumption by GM of the obligations of the Bondall Co.

Manufacturing activities formerly conducted by the Bondall company at its St. Louis plant are now being carried on at the same location under Inland direction with augmented facilities and equipment. Products manufactured include friction material, brake linings, clutch facings, etc.

## Ford to Exhibit At Earls Court

It has been announced by the English Ford Motor Co., whose plant is at Dagenham, near London, that it has reached an agreement with the Society of Motor Manufacturers and Traders whereby Ford products will be exhibited this year at the Earls Court passenger car show in October and at the truck show in November.

Many years ago—as far back as 1910—Ford refused to sign the exhibitor's bond, undertaking not to exhibit at shows in England unauthorised by the Society, while for several years past—up to 1937—Ford organized a show of

its own at the Albert Hall, London, exhibiting cars, trucks, tractors and other products.

Ford, it is stated, has now signed the S.M.M. and T. bond, thus falling into line with every other British motor vehicle manufacturer and the majority of the manufacturers and British distributors of imported cars and trucks.

## GM Stockholders Number 388,758

The total number of General Motors common and preferred stockholders for the second quarter of 1939 was 388,758, compared with 388,650 for the first quarter of 1939 and with 403,282 for the second quarter of 1938.

There were 367,365 holders of common stock and the balance of 21,393 represents holders of preferred stock. These figures compare with 367,280 common stockholders and 21,370 preferred for the first quarter of 1939.

## Australia "Determined"

(Continued from page 29)

It is reported that a recent searching technical investigation has shown that there are no engineering or other technical difficulties in the way of the manufacture of complete cars in Australia. Recent estimates have indicated that Australian production costs of the chassis of a typical popular car in the low price class would not appreciably exceed the present duty-paid, landed costs of imported chassis.

Confusion surrounding the knowledge of the exact status of present plans is mirrored in the Australian press which as carried reports varying from "no proposals for the manufacture of complete engines have been submitted" to "manufacture of complete engines may be undertaken by an all-Australian company with a capital of from £1,000,000 to £1,500,000."

## Armco Australian Mill

At Port Kembla, N. S. W., about 60 miles from Sydney, has recently been opened the Commonwealth Rolling Mills—a joint venture of American Rolling Mill Co. of this country and Lysaghts of England. Major portion of the plant's output is expected to be absorbed in the body building industry. The mill is producing silver finish auto body sheets, a class of material which is believed not to have been manufactured previously in the Southern Hemisphere. Investment in the plant is about \$2,900,000 and the works are giving employment to about 400. Over 80 per cent of the plant investment is represented by Australian made machines and plant equipment.

The technical side of the venture is being controlled largely by Armco men sent from the U. S. These production men and metallurgists maintain that the quality of the sheets will be in every way up to the standard of the American sheets.



Acme

## For Water Highways Only

Designed like a motorcar without wheels, this new type of motorboat was tested recently on the Thames at Isleworth near London, England. Powered by a nine hp. engine, it is said to be capable of a speed of 35 m.p.h. The craft has been submitted to authorities for approval as a police patrol boat for emergency work.



# UAW-AFL Attempted Strike At GM Called "Faux Pas"

## Observers of Developments in Factional Labor Dispute See Loss of Prestige for Martin Group

Observers of developments in the involved dispute between rival factions in the UAW interpret the unsuccessful attempt of the AFL faction of the union to call a strike in Flint and Saginaw plants of General Motors as a faux pas that resulted in the loss of face and prestige by the Homer Martin following.

The GM strike was attempted by the UAW-AFL in an attempt to secure recognition for bargaining rights after the rival UAW-CIO had succeeded in gaining temporary recognition, at least, in the settlement of the Briggs Mfg. Co. strike in Detroit, a settlement in which the Martin faction was given no recognition. The Flint and Saginaw strikes were unsuccessful when CIO followers refused to recognize AFL picket lines and not enough workers remained away from their posts to stop production. Although several brushes took place between members of rival factions and a tense situation prevailed efficient police action prevented actual rioting. Martin called off the strike attempt on June 15, announcing that he had won from GM officials assurance that representatives of his faction would be welcome at all times to confer on problems affecting members. The same assurance was extended to CIO representatives, however, in a letter issued by F. M. Tanner, GM vice-president, whose statement indicated that the corporation was recognizing union committees in 48 plants where there was no jurisdictional dispute, but that in 11 plants where such disputes did exist the corporation was refusing to recognize either faction to the exclusion of the other, and that it could not do so until the courts had ruled which side has the right to represent UAW in its contractual relations with GM. The statement added that in the meantime the corporation was prepared to confer with officers of each faction in regard to the situation in those plants where committees have been rendered inactive by the dispute.

Further difficulties for Martin were expected to result from his later action in removing 35 organizers and other key staff members from his payroll, a move which more than cut in half his active organization of staff workers. Considerable resentment resulted from this move which was expected to precipitate a bitter battle between radical and conservative elements in the union.

Failure of the Flint and Saginaw strike attempts brought a modicum of peace to the industry at the tail end of its production season; although further difficulties were anticipated if the UAW-CIO went through with its an-

nounced intention of asking for a supplemental agreement with GM for tool and die workers, a move which probably would be countered by a similar demand from the Martin faction.

## Polk Reports 65% Increase In New Car Registrations

Completed reports on new passenger car registrations in 14 states in May give those states a 65.09 per cent increase over registrations in May 1938, according to R. L. Polk & Co.

The 14 states had a combined total of 50,296 units in May as compared to 30,466 in May a year ago. May 1939 registrations were also 5.07 per cent greater than the 47,870 recorded by the same 14 states in April this year.

Thirteen states of the nation report a new truck registration in May of 8109 units. This exceeds the 5230 registrations in the same states in May a year ago by 55.05 per cent. It is one per cent below the 8191 registrations in the same states in April, however.

## British Garages Tapped For Territorial Army

The National Service Committee of the Retail Motor Industry of Great Britain has been notified by the War Office that a number of army field workshops, ordnance field parks and other important technical units are to be formed at once in many different parts of the country as part of the establishment of the Territorial (Vol-

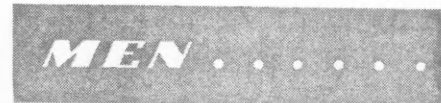
unteer) Army, and that it is hoped to obtain the required officers and men for these units from the motor trade.

Lord Austin, chairman of the National Service Committee, has sent to hundreds of garage proprietors a personal letter urging support for this new national service effort.

Commanded by an officer holding the rank of lieutenant-colonel, each army field workshop will have a complement of 12 officers and about 500 other ranks. In time of war its principal duty will be to maintain, service and repair the vehicles and armaments of mechanized units in the field.

An ordnance field park will consist of 14 officers and about 300 other ranks and its main function in wartime will be to supply motor vehicles, guns, instruments and spare parts urgently required by the forces in the field to replace casualties.

It is estimated that approximately 150 officers and 5000 other ranks in all will be needed to bring this new units up to wartime strength.



T. N. Berlage has been appointed director of sales for the corrugating division of Standard Steel Spring Co.

Verne L. Smithers, president of the V. L. Smithers Laboratories of Akron, has been appointed commissioner of the National Battery Manufacturers Association to succeed W. J. Parker of New York. Mr. Parker has been secretary and commissioner for more than 10 years.

Three leaders in the rubber and tire industry were honored when honorary degrees were conferred upon F. A. Seiberling and C. W. Seiberling, president and vice president respectively of the

## New Truck Registrations\*

	April 1939	March 1939	April 1938	FOUR MONTHS		Per Cent Change, 4 Months 1939 over 1938	Per Cent of Total Four Months	
				1939	1938		1939	1938
Chevrolet.....	16,386	16,565	11,824	58,573	43,934	+ 33.2	36.13	33.32
Ford.....	11,631	11,886	9,437	42,929	36,779	+ 16.5	26.48	27.90
International.....	5,617	5,507	4,850	20,117	18,660	+ 7.9	12.41	14.15
Dodge.....	4,688	4,852	3,618	17,363	13,192	+ 31.8	10.71	10.00
G. M. C.....	3,170	2,772	1,898	10,544	7,109	+ 48.5	6.50	5.39
Plymouth.....	1,014	879	766	2,910	2,842	+ 2.4	1.80	2.16
Mack.....	547	483	370	1,910	1,207	+ 58.5	1.18	.92
Diamond T.....	515	392	421	1,593	1,523	+ 4.9	.98	1.16
White.....	402	349	314	1,339	1,207	+ 11.0	.83	.92
Studebaker.....	172	190	184	674	655	+ 3.0	.42	.50
Reo.....	106	175	263	608	955	- 36.4	.37	.72
Autocar.....	149	150	119	576	455	+ 26.7	.36	.35
Brockway.....	139	168	127	532	334	+ 59.2	.33	.25
Divco.....	155	153	161	531	330	+ 61.0	.33	.25
Willys-Overland.....	141	148	175	474	674	- 29.6	.29	.51
Federal.....	137	122	130	423	496	- 14.9	.26	.38
Hudson.....	53	39	79	183	342	- 46.5	.11	.26
Bantam.....	36	60	.....	167	.....	.....	.10	.....
Sterling.....	24	17	26	95	68	+ 39.8	.06	.05
Indiana.....	19	24	42	78	157	- 50.2	.05	.12
Stewart.....	3	5	43	66	122	- 45.9	.04	.09
F. W. D.....	13	10	35	61	145	- 58.0	.04	.11
Miscellaneous.....	84	137	152	355	649	- 45.3	.22	.49
Total.....	45,201	45,083	35,034	162,101	131,835	+ 23.0	100.00	100.00

\* Complete except for Tennessee for April.



Seiberling Rubber Co., and on George Oenslager of Goodrich, inventor of the process of organic acceleration now used universally in the rubber industry.

Lloyd R. Vivian, advertising manager, Ditzler Color Co., has been elected president of the Industrial Marketers of Detroit, chapter of the National Advertisers' Association, for the 1939-40 season. Elected vice president for the coming year was T. B. Moule, advertising manager, Ex-Cell-O Corp., L. D. Worden, Morse Chain Co., was named secretary, and J. Ashburne, Jr., Nash-Kelvinator Corp., was re-elected treasurer. Elected to serve a three-year term on the board of directors was W. J. Chappell, advertising manager, Silent Automatic division, Timkin-Detroit Axle Co. A. F. Denham, Denham & Co. agency, was elected to serve as director for the next two years, while H. F. Belcher, sales manager, Insto Gas Co., was named director for a one-year term.

Marshall L. Havey has been elected a vice president of the New Jersey Zinc Co. and its subsidiaries. R. M. Neumann has been appointed sales manager; he will continue as manager of the pigment division of the New Jersey Zinc Sales Co. A. E. Mervine has been appointed assistant general sales manager; he will continue as manager of the metal division of the New Jersey Zinc Sales Co.

Edgar N. Gott, loaned to the Aeronautical Chamber of Commerce of America last February to assist the new president, J. H. Jouett, in reorganizing and revitalizing the aircraft manufacturing industry's trade association, has returned to his duties as vice-president of Consolidated Aircraft Corp.

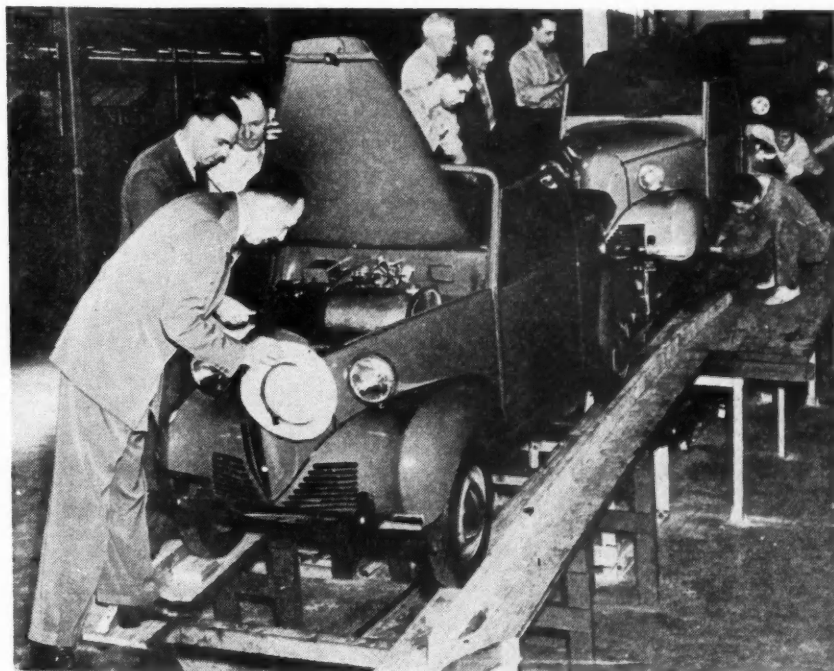
Wellwood E. Beall has been promoted to the post of chief engineer of the Boeing Aircraft Co. Formerly, Mr. Beall was engineer in charge of all commercial projects.

Howard O. Ward, director of advertising and sales promotion, export division, Chrysler Corp., has been elected president of the Adcraft Club of Detroit to succeed Hal G. Trump on July 1.

James I. Simpson, formerly vice-president and general manager of Dunlop Tire and Rubber Goods Co., Ltd., Toronto, Ont., has been elected president of the company, and Arthur B. Purvis, former president, has been elected vice-chairman of the board.

Karl M. Greiner has been named manager of the Parts and Service Department of the Nash Motors Division, Nash-Kelvinator Corp.

Phil J. Duggan has been appointed Canadian merchandising manager for Nash Motors.



Acme

### Crosleys Start Rolling Off the Line

First Crosley car to come off the assembly line in the plant at Richmond, Ind., is inspected by Powel Crosley, president of the Crosley Corp. (See story on page 30, "Crosley Car Placed on Sale in New York Department Store.")

### American Bosch Diesel School

The American Bosch Corp., Springfield, Mass., has announced that it will shortly open a school of instruction in the operation and maintenance of fuel injection equipment for Diesel engines. The school will be conducted as a separate division of the American Bosch plant at Springfield, Mass.

There will be no charge and courses will last from one to two weeks, but it is pointed out that due to the widespread demand for Diesel training by mechanics and students not connected with the Diesel industry, attendance will be limited to those who are at present directly concerned with the design, installation, operation and maintenance of Diesel equipment.

### Willys Reports Quarter Loss

Willys-Overland Motors, Inc., reported a net loss of \$755,846 for the first quarter of 1939 after depreciation, taxes and other charges and makes a net loss of \$188,222 for the first half of the current fiscal year.

For the quarter ended March 31 the net sales were \$5,663,572 and cost of sales was \$5,660,383 leaving a gross profit of \$3,190. Other income was \$16,977. Administrative expenses were \$758,895, interest \$4,026, and other deductions amounting to \$13,092.

As of March 31 the balance sheet showed \$3,248,154 of current assets including \$1,504,025 cash as against

\$1,516,536 of current liabilities including \$600,000 of bank loans.

Inventories were \$1,870,752 as of March 31. The total assets stood at \$14,028,990, capital surplus was \$9,048,640 and operating deficit \$1,836,108.

### Spicer Mfg. Co. to Pay Dividends on July 15

Spicer Mfg. Corp., will pay a dividend of 50 cents a share on common and the regular quarterly dividend of 75 cents on preference stock on July 15 to holders of record July 1.

### Motor Products to Build Truck Refrigerating Unit

Manufacture of a refrigerating unit for highway transport trucks is to be undertaken by Motor Products Corp. A newly formed company, Aniculaire A.C.A. Corp. of Detroit, owns patents on the unit and will handle sales. It is understood that an experimental unit is being installed in a Freuhauf trailer.

### Taylor Sales Engineering Co. Purchases New Plant

The Taylor Sales Engineering Co., Elkhart, Ind., has moved its office and plant to larger quarters in a new building in Elkhart, Ind. The new facilities, located at 117-123 W. Franklin Street, increase the company's plant capacity to 80,000 sq. ft.

# Rebuttal Testimony Being Given In FTC vs. General Motors Case

*Ourselves and Government—A Check List  
Of Federal Action Corrected to June 23*

## FEDERAL TRADE COMMISSION

**VS. GENERAL MOTORS.** Rebuttal testimony being presented by respondent. Case involves FTC allegation that GM dealers are required to handle GM parts exclusively.

**SIX PER CENT CASE.** Next step will be final arguments but no dates have been fixed. Testimony has been concluded in GM case but not in the Ford case. Involves the charge that both companies engaged in false and misleading representations in finance plan advertising.

**FAIR TRADE PRACTICE RULES.** (No new developments.)

**F.O.B. PRICE CASE.** Both cases, involving the FTC allegation that both Ford and GM price advertising is misleading, are still open for testimony.

## Auto-Union Reports Increased Activity

Germany's leading manufacturer of motor vehicles—the Auto-Union, is enjoying a period of marked prosperity, according to a report from Consul J. F. Huddleston, Dresden, made public by the Department of Commerce. The Auto-Union is composed of the Horch, Wanderer, Audi, and DKW automobile factories and the DKW motorcycle plant.

According to figures just issued in Germany, exports of Auto-Union motor vehicles in the seven-month period ended May 31 totaled 17,504 units consisting of 9230 automobiles and 8274 motorcycles.

The recently issued annual report of the company states that more than 52,000 Auto-Union motor cars were licensed in Germany during 1938 of which 40,000 were DKW cars. The value of exports of Auto-Union products increased from \$11,100,000 in 1937 to \$15,200,000 in 1938, an advance of 37 per cent.

## ADVERTISING

Paul W. Garrett, General Motors Corp. director of public relations, told the Advertising Federation of America in his keynote address (June 19) that the "passing of individual action and the growing emphasis upon collective or group action" was to be deplored. He blamed the infiltration of foreign dogmas for this tendency. The program is one of the most elaborate ever undertaken by the AFA.

After an absence of 33 years, Penn-

sylvania Rubber Co., Jeannette, Penna., is back in national advertising. Hard-hitting, factual copy will be used, according to William S. Walker, account executive, Walker & Downing, Pittsburgh agency.

Pontiac dealers will pay 72 cents per name per year submitted by them to the motor car company for the circulation list of a new owner-and-prospect magazine. The second issue ran more than 300,000 copies.

Chrysler's "World's Fair Special" used car campaign has shown excellent results. Chrysler, DeSoto, Dodge, and Plymouth dealers report. The drive was started with an appropriation of \$500,000, and executives are now discussing the possible continuation of the campaign.

Willard Storage Battery Co., Cleveland, is planning a double-headed campaign, with the company placing magazine copy and distributors and wholesalers using direct mail and newspapers. Meldrum & Fewsmith, Cleveland, is the agency.

Advertising-conscious Julius Heil, governor of Wisconsin and a leading manufacturer of truck tank bodies, has approved the legend "America's Dairyland" for the 1940 automobile license plates of that state.

Graham Paige Motors Corp. tied in the Indianapolis Speedway winners with supercharging by sending out to dealers giant-sized telegrams signed by Robert C. Graham, executive vice-president, stating that "Graham is the one stock car in America offering this engineering triumph."

The Gulf Oil Corp. "Musical Playhouse" opened its summer season June 11 with Erno Rapee's orchestra. Young & Rubicam is the agency.

Following an eight-week vacation to begin June 30, the Texaco Star Theatre

will resume August 30 over the CBS network. Buchanan & Co. is the agency.

Joseph C. Elliff, western manager of the *Saturday Evening Post*, has resigned to accept an executive sales position with the Stewart-Warner Corp.

David R. Osborne, sales training director of Studebaker Corp., has written a book entitled "Salesmanship for Today for Sales Managers of Tomorrow," published by Harper & Brothers. Paul G. Hoffman, president of the company, wrote the foreword.

## Electric Auto-Lite Declares Dividend

Directors of the Electric Auto-Lite Co., have declared a dividend of 75 cents on common stock payable July 1 to holders of record June 23. Last previous dividend on April 1 was 50 cents a share and total dividends in 1938 amounted to a dollar a share. D. B. Stratton, Cincinnati, was elected a vice-president of the company.

## Australia Takes 34.5% Of British Car Exports

Analysis of British automobile exports in 1938 shows that Australia was again Britain's best customer, taking 23,608 (34.5 per cent) of the 68,267 cars and chassis exported by England and 4053 (28.3 per cent) of the 14,274 trucks and buses. New Zealand was second, taking 19.5 per cent of exported British cars and 18.5 per cent of the truck and bus exports. The Australian figures show an increase in both number and percentage relative to 1937.

After New Zealand there was a big drop to third place, taken by South Africa with only 5.1 per cent of cars and 6.1 per cent of "commercial" vehicles.

The average value of British cars and chassis imported by Australia was £74, whereas that of cars taken by New Zealand was £127. This big difference was mainly accounted for by the fact

## New Car Registrations and Estimated Dollar Volume by Retail Price Classes\*

	MARCH 1939		FIRST THREE MONTHS, 1939			
	Units	Dollar Volume	Units	Per Cent of Total	Dollar Volume	Per Cent of Total
Chevrolet Ford and Plymouth	140,434	\$102,700,000	347,679	56.36	\$254,300,000	48.59
Others under \$1,000	86,470	79,800,000	211,563	34.29	195,300,000	37.31
\$1,001 to \$1,500	18,431	21,400,000	48,982	7.94	57,400,000	10.97
\$1,501 to \$2,000	2,486	3,800,000	5,413	.88	8,400,000	1.60
\$2,001 to \$3,000	1,045	2,400,000	3,060	.50	7,000,000	1.34
\$3,001 and over	64	300,000	216	.03	1,000,000	.19
Total	248,930	\$210,400,000	616,913	100.00	\$523,400,000	100.00
Miscellaneous	108		279			
Total	249,038		617,192			

\* All calculations are based on delivered at factory price of five-passenger, four-door sedan, in conjunction with actual new car registrations of each model. The total dollar volumes are then consolidated by price classes.



that a larger proportion of the units imported by Australia were chassis for use with Australian-built bodies. The average value of all British cars and car chassis exported was £105 last year, £1 less than in 1937.

Passenger cars complete imported by Great Britain in 1938 came chiefly from U. S. A. and Germany; the former supplied 3597 (against 7085 in 1937) of an average value of £196, while Germany supplied 3367 (against 5212 in 1937) valued at £97 each. This low figure implies, though without official confirmation, that the German imports by Great Britain were mainly Opel cars. Great Britain also imported 250 car chassis from U. S. A. and 1061 cars and chassis from Canada. Imports from France took third place, after Germany; Italy, which was third in 1937 with a total of 2877 fell in 1938 to a bad fourth with only 949.

## Financing Trends for 1938 Reported by NASFC

For every 100 new cars sold in 1938, automobile dealers took 206 used cars, a new high, in trade. Repossessions of new cars in per cent of the number financed increased from 2.2 per cent in 1936 to 4.1 per cent in 1937 and 6.3 per cent in 1938. These and other trends are shown by the National Association of Sales Finance Companies in its annual report entitled "Composite Experience of Sales Finance Companies and Automobile Dealers" for 1938.

Based upon statistics compiled from numerous authoritative sources, such as governmental, member, manufacturer and dealer association agencies, the report, accompanied by charts, discloses that the average loss per car repossessed increased from \$52 in 1937 to \$62 last year.

The association survey notes a healthier tone in terms of payment, with "a marked tendency to concentrate on paper of from 12 to 18 months maturity." It adds that "the percentage of paper with sub-standard down payments reached its height in 1935 at 34 per cent, with decreases each year since to 21 per cent in 1938."

Disclosing that the percentage of new cars sold on instalments by finance companies dropped from 59 per cent in 1937 to 52 per cent in 1938, the report states that this decrease "may be due at least in part to the increasing volume of bank financing by way of direct loans" and that "in such financing the dealer is paid the full price of the car at the time of sale and naturally does not report it as an instalment sale."

## Crude Rubber Consumption In May Topped '38 by 44%

Consumption of crude rubber by manufacturers in the United States during the month of May, 1939, is estimated to be 44,377 long tons, which compares with 44,166 long tons during April, 1939. May consumption, while

less than one per cent over April, was 44.3 per cent over May a year ago according to statistics released by The Rubber Manufacturers Association, Inc. Consumption for May 1938 was 30,753 (revised) long tons.

The Association reports gross imports of crude rubber for May to be 47,535 long tons, an increase of 60.6 per cent over the April figure of 29,601 long tons and 73.4 per cent over the 27,410 long tons imported in May, 1938.

Total domestic stocks of crude rubber on hand May 31 were estimated at 193,602 long tons, which compares with April 30 stocks of 190,896 long tons and 300,907 (revised) long tons on hand May 31, 1938.

Crude rubber afloat to United States

## CALENDAR

### Conventions and Meetings

Automotive Engine Rebuilders Association, Seventeenth Annual Convention, Baltimore, Md. ....	July 5-7
National Petroleum Association, Annual Meeting, Atlantic City, .....	Sept. 14-15
SAE Tractor Meeting, Hotel Schroeder, Milwaukee, Wis. ....	Sept. 28-29
SAE National Aircraft Production Meeting, Ambassador Hotel, Los Angeles, Calif. ....	Oct. 5-7
SAE Annual Dinner, Hotel Pennsylvania, New York, N. Y. ....	Oct. 16
American Welding Society, Annual Meeting, Chicago ....	Oct. 22-27
American Trucking Association, Annual Meeting, Chicago ....	Oct. 23-24
SAE Transportation & Maintenance Meeting, Coronado Hotel, St. Louis, Mo. ....	Oct. 26-27
SAE Fuels & Lubricants Meeting, Mayo Hotel, Tulsa, Okla. ....	Nov. 2-3
American Petroleum Institute, Annual Meeting, Chicago ....	Nov. 13-17
National Independent Traffic League, Annual Meeting, Chicago ....	Nov. 23-24
Motor & Equipment Wholesalers Association, Annual Convention, Chicago ....	Dec. 8-9
SAE Annual Meeting & Engineering Display, Book-Cadillac Hotel, Detroit ....	Jan. 15-19, 1940

### Shows at Home and Abroad

Automobile Accessories Association, Sixth Annual Exposition, Navy Pier, Chicago ....	Aug. 7-10
National Machine Tool Show, Cleveland ....	Oct. 4-13
Great Britain, London, Automobile Show ....	Oct. 12-21
National Automobile Show, New York, .....	Oct. 15-21
American Society for Metals, International Amphitheatre, Chicago, .....	Oct. 23-27
Italy, Milan, Automobile Salon, .....	Oct. 25 to Nov. 11
International Automobile, Motorcycle and Motor Boat Show, Budapest, .....	Oct. 27 to Nov. 6
Great Britain, London, Commercial Automobile Transportation Show, .....	Nov. 2-11
National Truck Show, Chicago ....	Nov. 8-16
Great Britain, Glasgow, Scotch Automobile Show ....	Nov. 10-18
Automotive Service Industries Show, Navy Pier, Chicago ....	Dec. 11-16

ports as of May 31 is estimated to be 54,046 long tons which compares with 57,918 long tons afloat on April 30 and 32,859 long tons afloat on May 31 a year ago.

May reclaimed rubber consumption is estimated at 13,517 long tons, production 14,769 long tons, stocks on hand May 31, 22,771 long tons.

## Retail Automobile Sales Up 44 Per Cent in May

Retail sales of passenger cars and trucks to the number of 321,614 during the month of May represented an advance of 44 per cent over last year, the Automobile Manufacturers Association reports. Included in the month's total were 275,457 passenger cars and 46,157 trucks. The gain in passenger cars was 47 per cent, while trucks gained 30 per cent.

By comparison with April, which in some years has been the peak month, May this year revealed an increase of 3.6 per cent in passenger cars and 2.2 per cent in trucks. This represents a gain of an even 3 per cent for the two classes of motor vehicles combined.

During the five months ending with May, 1,382,793 motor vehicles were sold, the manufacturers report. This is equivalent to a gain of 40 per cent over the 988,912 units sold up to the corresponding point last year. Of the total, 1,164,149 units were passenger cars and 218,644 were commercial vehicles. Passenger cars gained 43 per cent, trucks 26 per cent in the five-month period, respectively.

Factory sales for the half year ending with June are estimated by the Automobile Manufacturers Association at approximately 2,000,000 motor vehicles. This is an advance of 53 per cent over last year.

## Vacations "With Pay"

The annual vacation with pay will soon become commonplace in American industry if the movement continues to grow at the present rate, the Bureau of Labor Statistics announces, reporting that in the automobile industry out of 26,091 salaried employees working for 285 plants surveyed, 25,817 in 1937 received vacations with pay.

The report also showed that out of 436,687 wage earners working for 138 plants, 118,526 were included under vacation-plans adopted. Under the classification, "transportation equipment," which included aircraft, automobiles, electric and steam-railroad cars, locomotives and shipbuilding, 165,114 employees out of a total of 711,700, or 23.2 per cent, were listed as being beneficiaries of vacations - with - pay plans.

## L. S. Maremont

L. S. Maremont, 63, one of the original founders of Maremont Automotive Products, Inc., passed away at his home June 8, 1939, after a long illness.



## AUTOMOTIVE INDUSTRIES

### Summary of Automotive Production Activity

**BUSES** One large producer reports production climbing near to the 60 per cent capacity mark. Same company expects to continue at this pace throughout the summer. General conditions in this field "pretty fair."

**TRUCKS** Reports on production and retail sales range from "fair" to "very good." Several companies report increased sales, and voice expectations for continued improvement. In general, it seems that 1939 will be "a healthy truck year."

**TRACTORS** Three major companies are said to "have their fingers crossed." Those strictly in agricultural business are feeling the acute agricultural situation more keenly than others. Combined business is considerably down this year reflecting general condition in agriculture.

**AUTOMOBILES** Estimates indicated that June would be a more than 300,000 car and truck month and perhaps even pass May production which totaled approximately 312,000 units. Although there have been signs of tapering off as the end of the production season approaches, it appears that July production will account for close to 200,000 additional units.

**MARINE ENGINES** Conditions only fair with many manufacturers not producing as anticipated earlier in the spring. Outboard builders report fair production schedules.

**AIRCRAFT ENGINES** Several plants have increased manufacturing capacity, and some machine tools and equipment have been ordered to step up production. Backlogs of orders continue to pile up.

*This summary is based on confidential information of current actual production rates from leading producers in each field covered. Staff members in Detroit, Chicago, New York and Philadelphia collect the basic information, in all cases from official factory sources.*

(Copyright 1939, Chilton Co., Inc.)

## British Engineers To Meet with ASME

Members of the Institution of Mechanical Engineers of Great Britain are reported to be coming to the United States this fall to meet with The American Society of Mechanical Engineers at the New York World's Fair, Sept. 4-8. The British group will also visit Boston, Toronto, Detroit, Cincinnati, White Sulphur Springs, Washington and Philadelphia.

At the time of the New York meeting the two societies of mechanical engineers will be joined by the Institution of Civil Engineers and the Engineering Institute of Canada, who are meeting with the American Society of Civil Engineers.

## Du Pont Builds New Ethylene Glycol Plant

E. I. du Pont de Nemours & Co. announces it is building a plant for the production of ethylene glycol at its Belle, W. Va., works. The new plant is expected to be in production in 1940. The Ethylene glycol produced will supply the company's requirements for this material and, furthermore, will be sold for use as an antifreeze by the company's "Zerone" division.

## New Internal Set-Up for ICC Effective July 1

The Interstate Commerce Commission has undergone self-reorganization, with its new internal set-up effective July 1 under an order published last month. By the terms of the order the

following changes have gone into effect. Commissioner Eastman has been unanimously elected chairman for a three-year term. The Commission is divided into five divisions instead of seven. The divisions are as follows:

Division one: *Administrative*—Commissioners Eastman, Porter and Lee. Division two: *Rates, Tariff and Valuation*—Commissioners Aitchison, Splawn and Caskie. Division three: *Rates, Service and Safety*—Commissioners Mahaffie, Miller and Alldredge. Division four: *Finance*—Commissioners Porter, Mahaffie and Miller. Division five: *Motor Carriers*—Commissioners Lee, Rogers and Alldredge.

Instead of the eleven former standing committees there are now only two—a Legislative Committee and a Committee on Rules and Reports. The chairmanship, instead of rotating annually as it has done since 1911, will now be for a term of three years. The order is designed to greatly increase the authority and administrative responsibility of the chairman.

The ICC anticipates that the reorganization will speed up its entire machinery and that public interest will be served.

## GM's Knudsen to Assist in Education Orders Program

William Knudsen, president, General Motors Corp., Donald W. Douglas, president, Douglas Aircraft Co., and J. L. Perry, president of Carnegie-Illinois Steel Corp., have been named by Assistant Secretary of War Louis Johnson, together with six other industry representatives, to assist in the distribution of orders under the Administration's \$34,500,000 educational

orders program, designed to familiarize industry with the government's wartime requirements.

Others named include the following:

E. M. Allen, president of the Mathieson Alkali Works; Carl L. Bausch, vice-president of Bausch & Lomb Optical Co.; F. D. Bell, president of Edgewater Steel Co., Pittsburgh; William H. Coleman, president, Bucyrus-Erie Co.; John Hancock, of Lehman Bros., a World War Naval Supply Corps officer; and Charles J. Stillwell, vice-president, Warner-Swasey Co.

The War Department awarded its first educational orders in April under a Congressional appropriation made last session. The full \$2,000,000 appropriated for the current fiscal year went for orders placed with six companies.

The approved \$34,500,000 authorization would cover expenditures for the next three years, but Congress has yet to authorize an appropriation for the new fiscal year which begins July 1. Approximately 270 plants are expected to receive trial orders under the new program.

## Belgium Firm May Use Mack Lanova Engine

According to reports in the European automobile press, the Miesse firm of Belgium, which is building a large eight-wheeled truck that up to now has been equipped with a 100-hp. Diesel engine built under Gardner license, is considering the adoption of the more powerful Mack Lanova engine. This truck steers on all four wheels but is driven through only two of the wheels, those on the third axle from the front, which is located not far from the middle of the length of the chassis.

## Synthetic Diesel Fuel Produced in Germany

Synthetic fuel for high-speed Diesel engines is being made in Germany on a commercial scale, according to reports received by the Commerce Department. The first large-scale plant for producing the heavy motor fuel has been established by the Steinkohlenbergwerk Rheinpreussen A. G. (Rheinpreussen Coal Mining Co.).

The report said that raw materials used include a mixture of tar oils produced in the coking of bituminous coal and so-called "Kogasin II," a material produced from gasified coke, or carbon monoxide and hydrogen. These materials possess special fuel properties, and when mixed complement each other in creating what experts in Germany claim to be a superior Diesel fuel similar in characteristics to gasoline and benzol when combined in light motor fuel mixtures.

While the output of the new plant is not known, it is expected to be small, since obviously the new Diesel fuel suffers the handicap of high cost compared with petroleum-derived Diesel oil.

## PUBLICATIONS

Heating and cooling products manufactured by the Young Radiator Co., Racine, Wis., are described in a folder issued by the company.\*

Three leaflets recently brought out by the Felt Products Mfg. Co., Chicago, are: "Felt-Seal Thiokol Treated Gaskets," "Alutex" (insulation) and "Better Sealing with Felt-Pro Sealmaster Copper Asbestos Type Cylinder Head Gaskets."\*

A folder by Automotive Rubber, Inc., describes application of its **seamless rubber processing** to a variety of products.\*

A catalog covering its **Ledaloyl self-lubricating bearing bronze**, now available in small quantities, has been published by Johnson Bronze Co.\*

The Bristol Co. announces the publication of a bulletin (No. 533) on its new **thermal converter**, known as the Thermo-verter. The bulletin describes it as it is used with potentiometers and millivoltmeters for a-c electrical power measurement and totalization.\*

Sun Oil Co. has published a booklet designed to furnish information on **petroleum products**, it contains information on industrial lubrication.\*

American Chemical Paint Co. has published a bulletin on its Rodine **pickling inhibitor**.\*

B. F. Goodrich Co. has just published its 1939 edition of the "Operator's Handbook" designed to provide information for the users of all types of **tires** other than those for passenger cars.\*

The properties of molded **Plaskon** and the technique of molding Plaskon are covered in the Plaskon Handbook prepared by the Plaskon Co., Inc., Toledo, Ohio.\*

The Bureau of Standards has announced reaffirmation of **simplified practice R-161-35**, which establishes a standard number of units in packages of automotive (bus) engine parts and **simplified practice R-162-35**, which covers a standard unit of pack for compressor and governor parts for air brakes. Copies of these recommendations may be obtained from the Superintendent of Documents, Government Printing Office, Washington, for 5c. each.

"**Belting Biographies**," a 36-page booklet describing the company's complete line of transmissions and conveyor belts, has been published by the Mechanical Goods Division, United States Rubber Co.

"**Pyrometers and Resistance Thermometers**," a 4-page folder issued by The Foxboro Co., Foxboro, Mass., contains brief descriptions of several of the following instruments in the Foxboro line of pyrometers: the Potentiometer Indicating Recording Controller, the Potentiometer Recording Pyrometer, Potentiometer Controllers for Electric or Air-Operated Control, the Stabilog Potentiometer Controller, the Potentiometer Indicating Pyrometer, the Mono-Pivot Type Indicating Pyrometer, the Portable Indicating Potentiometer and the Key-Switch Cabinet Indicating Potentiometer.\*

"**Highway Taxation, Finance and Administration**" is the title of a pamphlet brought out by National Highway Users Conference, Washington, D. C.

\* Obtainable from editorial department, AUTOMOTIVE INDUSTRIES. Address Chestnut and 56th Sts., Philadelphia.

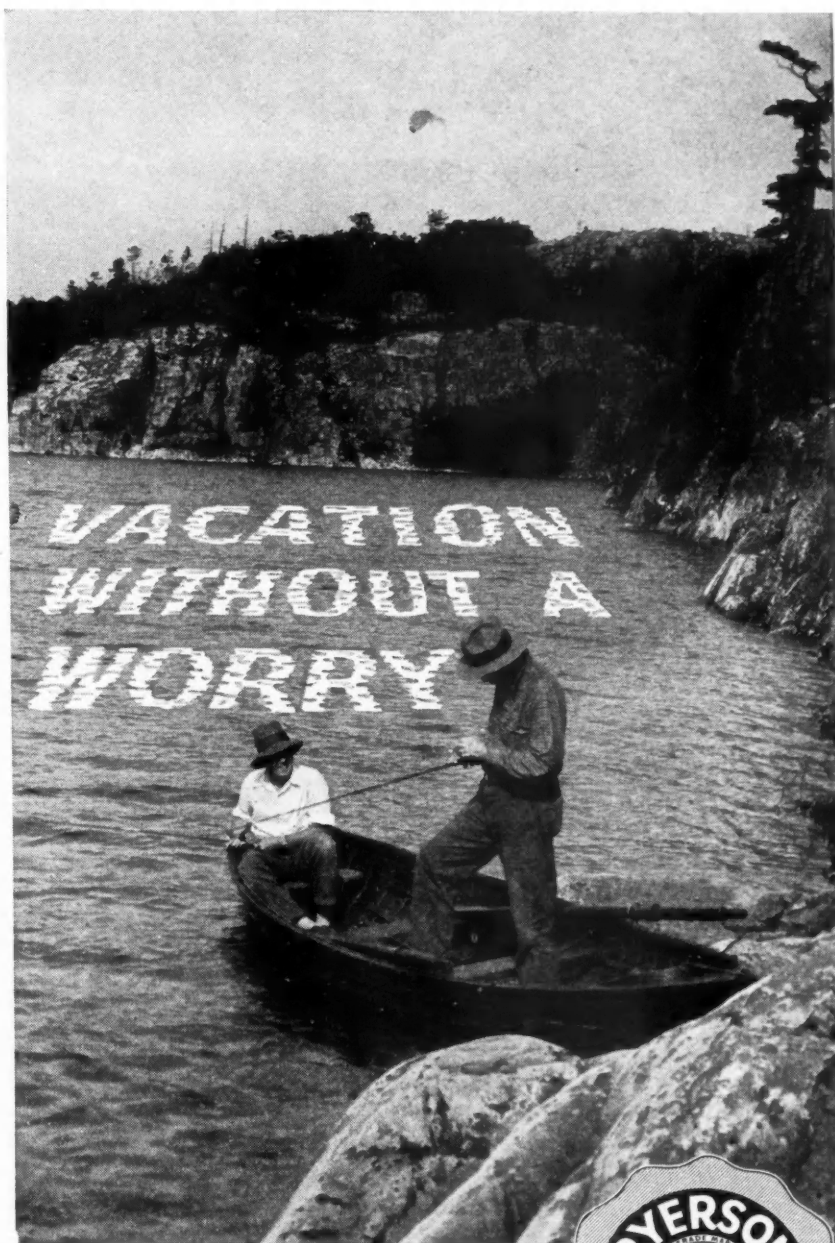
## S.A.E. Handbook — 1939 Edition

The 1939 edition of the *S.A.E. Handbook* has been published by the Society of Automotive Engineers. Changes in the new edition include new and revised standards since publication of the 1938 Handbook. The new book lists as canceled standards on chromium plating, die materials, nickel plating, protective coatings (alum) and rare metals.

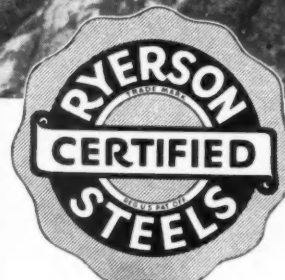
New standards included in the 1939 edition cover — *Aircraft*: Accessory mounting (engine); generator flange;

generator mounting (6 bolt); governor mounting; magneto flange; propeller shaft end (No. 60); vacuum pump mounting. *Ball Bearings*: Aircraft, radial; shoulder diameters. *Non-ferrous Metals*: Cadmium bearing alloys; copper-lead bearing alloys; wrist pin bearings. In addition, there are given new standards on speedometers and Diesel electric systems.

Copies of the 1939 edition are available from S.A.E. headquarters, 29 W. 39th St., New York City. Price is \$2.50 to members; \$5 to non-members. Individual pages are available at two cents to members, five cents to non-members.



The Ryerson "Vacation Without a Worry" plan eliminates all thought of delayed, slow or uncertain steel deliveries. It also gives you assurance against interrupted shop schedules, fabricating delays and increased production costs. All you need do is leave the vacation order, "Call Ryerson when steel is needed." Emergency as well as regular requirements will be shipped promptly from Ryerson stocks of Certified Quality Steels—steels selected for uniformity and desirable working qualities—in short, steels that save shop time, reduce spoilage and lower labor costs. Be sure the Ryerson Stock List is handy as a buying reference, and let us help you make yours a real vacation without a worry. Joseph T. Ryerson & Son, Inc. Plants at: Chicago, Milwaukee, St. Louis, Cincinnati, Detroit, Cleveland, Buffalo, Boston, Philadelphia, Jersey City.





## ABSTRACTS

### Diesel Engines for British Motorship

Rather unusual problems were encountered in the design of the Diesel engines for the British motorship "Research," which is to make magnetic surveys in the Indian Ocean, continuing the work which between 1909 and 1929 was carried on by the American ship

"Carnegie." The latter was fitted with gasoline engines and was wrecked by a gasoline explosion in which its captain perished. As evidence of the need for constant study of the earth's magnetic fields it is pointed out that in Great Britain the deviation of the magnetic from the true north has changed 37 deg. since 1700.

In the design of the engine it was necessary to eliminate magnetic parts completely. In fact, there is only 250 lb. of magnetic material in the entire ship, and this seems to be in the field frames and armatures of the two 4 kw. generators carried on board. The ship

is equipped with a four-cylinder two-cycle Atomic engine developing 160 hp. at 375 r.p.m. and weighing approximately 28,000 lb. Cylinder head and crankcase are cast of aluminum bronze. The cylinders are of Ni-Resist, a high-nickel non-magnetic alloy, and cylinder blocks of aluminum are cast around these liners. To prevent endwise motion of the liners in the block, the former are provided with corrugations in their outer surface. A bronze alloy was tried for the crankshaft, and while it had adequate strength for normal operating conditions, its low modulus of elasticity made it highly susceptible to torsional vibration. Finally a manganese-nickel-chromium steel was chosen for the purpose, which has non-magnetic qualities. This same steel is also used for the lay shaft. The crankshaft forging is said to have cost about twenty times as much as that of the crankshaft for the standard Atomic engine. The engine has a bronze bed plate and a solid bronze flywheel weighing 2350 lb. All gear wheels, casings, bolts and nuts are of the same bronze alloy, highly finished, and the engine is said to present a striking appearance.—*The Engineer*, April 7.



### • • • Unequalled SURFACE SMOOTHNESS and SPHERICITY

The series of lapping operations performed as a matter of course in the Strom plant give Strom Steel Balls a degree of surface smoothness and sphericity that has always been unequalled in any other regular grade of ball. Only through such unique lapping practice can extreme precision be obtained.

Physical soundness, correct hardness, size accuracy, and sphericity are guaranteed unconditionally in all Strom Balls.

Other types of balls—*stainless steel, monel, brass and bronze*—are also available in all standard sizes. Write for catalog and prices.

# Strom

## STEEL BALL CO.

1850 So. 54th Avenue, Cicero, Ill.

*The largest independent and exclusive Metal Ball Manufacturer*

### Combustion Turbines

The combustion turbine is an old idea as indicated by the fact that a book on the gas turbine by H. H. Supplee appeared in this country more than a quarter of a century ago. Holzwarth in Germany, with the backing of one of the large steel companies, built a 1000 hp. gas turbine shortly before the outbreak of the World War, and also published a book on the subject, but the development was interrupted by the war and was not resumed later. A theoretical analysis of the problem of the gas turbine was made for the British Air Ministry shortly after the war, but the conclusions arrived at were not very encouraging. Since that time little has been heard of gas turbines, with the exception of the type operating on exhaust gases, which is extensively used in Europe in combination with centrifugal blowers for scavenging and supercharging Diesel engines.

Combustion turbines may be either of the constant-volume (explosion) or the constant-pressure type. A new design of combustion turbine operating on the constant-pressure principle has been developed by the Hungarian engineer George Jendrassik of Budapest, whose Diesel engines are widely used in railcars in Europe. The experimental unit develops nearly 100 hp. at 16,400 r.p.m. Combined with the turbine proper as an accessory is a centrifugal compressor, the turbine runner and the impeller of the compressor being mounted co-axially. Starting is effected by means of an electric motor. Air compressed by the ten-stage centrifugal compressor leaves the compressor at an absolute pressure of 32.5 lb. per sq. in. and enters a heat exchanger, where



it absorbs heat from the exhaust from the turbine. From the heat exchanger the heated air passes on to the combustion chamber where, by the combustion of gas oil it reaches the highest temperature of the cycle. From the combustion chamber the gases of combustion pass into the turbine, where they expand. After expansion the gases return to the heat exchanger, where they give up some of their heat to the air from the compressor, and finally they are discharged through an exhaust duct.

A Bosch six-cylinder fuel-injection pump is used, the six outlets being combined in a single pipe which leads to the burner, the latter also a Bosch product. This injection pump, together with the speed governor and the oil pump, is driven from the compressor shaft through worm gearing. The fuel injected into the combustion chamber is ignited by a high-tension coil and spark plug located close to the burner nozzle.

In tests conducted at the Royal Hungarian Institute for Technology and Materials Testing, the turbine, loaded with a water brake, developed 98.5 hp. at 16,400 r.p.m., with a specific fuel consumption of 0.64 lb. per hp-hr. The temperature at the compressor inlet was 36.5 deg. Fahr. and that of the gases at the turbine inlet, 890 deg. Fahr.

The results are said to be sufficiently encouraging to warrant the hope that it will be possible to build combustion turbines of this type which will equal and possibly exceed the Diesel engine in efficiency. A more detailed, illustrated description of this turbine appeared in *Engineering* (London) of Feb. 17, 1939.

### New German Motor-Fuel Regulations

New regulations concerning the composition and anti-knock qualities of motor fuels, issued by the Supervisory Office for Mineral Oils, went into force in Germany on May 1. Four different grades of fuel for carburetor engines are provided for.

The gasoline-benzol mixture is to have an octane number of 80 (determined by the CFR Research Method). Sufficient benzol is to be added to the gasoline so the prescribed octane number is reached, but the benzol content must not be less than 30 per cent by weight.

Super-gasoline must have an octane number of about 80 (maximum 82). Up to 0.4 cu. cm. tetra ethyl lead per liter is to be added to the gasoline. In case this does not bring the octane number up to 80, benzol must be added as required, but the proportion of benzol in the fuel must not exceed 15 per cent by weight.

Regular gasoline Grade N must have an octane number of about 74 (upper limit 75). This grade of gasoline must be blended with 13 per cent alcohol, in accordance with the directions of the

Reichs Alcohol Monopoly. If this does not bring the octane number up to 74, benzol must be added to bring it up to that figure, but the benzol content must not exceed 10 per cent by weight.

Regular gasoline Grade S must have an octane number of 74 (upper limit 75), determined in accordance with the CFR Research Method. An addition of up to 0.4 cu. cm. of tetra-ethyl lead is to be made to this grade, and if this does not bring the octane number up to 74, benzol is to be added, but not in excess of 10 per cent by weight.—ATZ, April 25.

### Grob Brothers Sponsoring Independent Machine Show

An independent machine and tool exhibition will be held from Oct. 4 to 13 at the Central Armory in Cleveland under the sponsorship of Grob Brothers, Grafton, Wis., manufacturers of die making machinery. American, as well as foreign machine tool builders are exhibiting at the show. It is reported that much of the 13,000 sq. ft. of floor space available to exhibitors has been contracted for.



## Insist On LIFELONG ACCURACY

● Thermostatic controls—small devices with big responsibilities—left without attention for long periods—doing their jobs automatically. As moving parts they wear out just as automobiles do eventually—BUT here's the key to consistent performance:

DOLE BI-METAL, the actuating force in Dole Thermostats, does not fall off gradually in efficiency. It will flex an indefinite number of times without fatigue. This means these elements CAN be left without attention for long periods to do a control job automatically, just as well the 5000th time, or 5,000,000th as the first—right up to the point where other moving parts fail. Elements of Dole Bi-Metal will, like faithful servants, work until they drop . . . and work accurately to the last.

### Dole Bi-Metal Sold Separately

This special qualification recommends Dole Thermostats as motor temperature controls for your cars—or Dole Bi-Metal as raw or partly fabricated material for any thermal control devices you make. Write for engineering data or buying information on either or both.

**THE DOLE VALVE COMPANY**  
1901-1941 Carroll Avenue, Chicago, Ill.  
Offices: Detroit and Albany, N. Y.

# DOLE THERMOSTATS and BI-METAL

## BOOKS . . . .

*Highway Research Board, Proceedings of the Eighteenth Annual Meeting. Part I. Edited by Roy W. Crum, Director, Highway Research Board, Washington, D. C.*

Numerous papers dealing with highway finance, transportation economics, highway design, materials and construction; highway maintenance, traffic and safety, and soils investigation, which were read or presented at the

meeting held at Washington, D. C., Nov. 28-Dec. 2, are reprinted in this volume. Many of the papers are based on original research work or surveys, and as highway development is closely related to the use of motor vehicles, these reports are of considerable interest to the automotive engineer and executive.

Thomas H. McDonald, chief of the U. S. Bureau of Public Roads, discusses at considerable length the problem of the expenditure of motor vehicle revenues. He points out that in recent years the General Fund has been an active, and in many states a successful

contender for the motorists' tax dollar, but there is rising opposition to this practice, and as a result of the elections of last November, three states joined the four which had previously declared themselves constitutionally opposed to the use of highway revenues for non-highway purposes. Another interesting report is that on "Rural-Mail-Carrier Motor-Vehicle-Operating Costs on Various Types of Road Surfaces," by R. A. Moyer of Iowa State College. Data were obtained for 293 cars operated by rural mail carriers in Iowa and Indiana. Analysis of the cost data by the method of least squares showed that the average cost for gasoline, oil, tires and maintenance was 3.14 cents per vehicle-mile on earth roads, 2.54 on gravel, and 1.55 on pavement. The total unit costs of operating an average car for 8000 miles annually, based on the results of this study, amounted to 6.22 cents per mile on earth, 5.62 on gravel, and 4.63 on pavement. Other papers of more or less direct automotive interest include one on Acceleration and Deceleration Characteristics of Private Passenger Vehicles, by John Beakey, traffic engineer of the Oregon State Highway Department; Speed-Change Rates of Passenger Vehicles, by D. W. Loutzenheiser, assistant highway engineer of the U. S. Department of Public Roads, and Overtaking and Passing Requirements as Determined from a Moving Vehicle, by T. M. Matson and T. W. Forbes, research associates, Yale University Bureau for Street Traffic Research.

*Arc Welding in Design, Manufacture and Construction. Published by the James F. Lincoln Arc-Welding Foundation, Cleveland, Ohio.*

This book of more than 1400 pages (which sells at the very reasonable price of \$1.50) contains the papers accepted in the James F. Lincoln Arc-Welding Foundation Award Program which closed June 1, 1938. It may be recalled that the first award (of \$13,700) was granted for a paper dealing with welding in automotive production—"The Arc-Welded-Steel School-Bus Body, its Economic and Social Advantages," by H. C. Wendt, chief engineer of Hackney Bros. Body Co., Wilson, N. C.

Papers are arranged in the book according to a general classification, and the Automotive Section comes first. Besides the paper by Mr. Wendt it contains eight others, as follows: Sheet-Steel Line Truck Body Fabricated by Arc Welding, by Fred S. Beach; New Design of Side-Dump Semi-Trailer, by Nelson Severinghaus; A Refuse-Collection Vehicle Body, by Harry Wunsch; New Bus Bodies by Welding, by R. S. Rose; Trailerized Tanks by Arnold F. Meyer; Design and Production of an All-Welded Track Roller Frame Assembly, by C. A. Davis, Jr.; Savings Made by Arc-Welding in Tractor Construction, by Harold D. Bickford, and Redesign of an Existing House Trailer to

# DURO

## PRECISION DRILL PRESSES

### Ball Bearing

**★ BEST ★**  
*Where the  
Real Tests  
Are MADE*

Because only the finest materials are used in building Duro Tools; because they are designed by Engineers who know that accuracy and stamina are of paramount importance in a Drill Press; because Duro Engineers have made Duro Drill Presses so they will stand up under the hardest usage and still maintain precision performance.

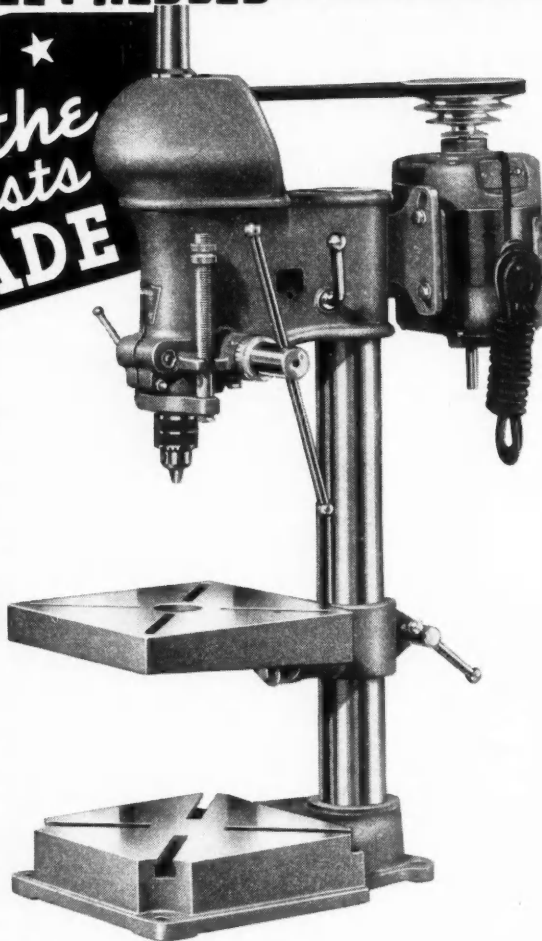
Reduce your investment and operating costs by installing Duro Precision Ball Bearing Drill Presses in your factory. Use them for drilling, tapping or any operation that requires an accurate Drill Press that can stand the "gaff." see one—try one—you'll buy one because then you will know why we say they are "Best where the real tests are made."

#### DEMAND THESE FEATURES — THEY ARE ALL IN DURO DRILL PRESSES

- ★ Extra weight in castings to withstand vibration under heavy loads and high speed.
- ★ Four large New Departure Sealed Ball Bearings provide proper support to insure free running of the six-spined spindle.
- ★ 4-step pulley independently mounted on New Departure Ball Bearings eliminates all possibility of strain on the spindle.
- ★ Rugged Base with "T" slots and heavy slotted table both machined and ground for accuracy.
- ★ Precision-made for precision work.
- ★ Jacobs Ground and Balanced 0-1/2" Chucks as standard equipment.
- ★ Low Initial Cost—Low Operating Cost—Low Maintenance Cost.

Manufactured By  
The Makers of America's Finest and Most Complete Line of Power Driven Machinery

**DURO METAL PRODUCTS COMPANY**  
Dept. PT-7 2663 N. Kildare Ave. CHICAGO, ILLINOIS



Permit of Arc Welding, by Ray F. Kuns.

The Automotive Section is followed by the Aircraft and this by the Railroad Section. In aircraft, welding, of course, is employed chiefly in the fabrication of the fuselage, wing structure, control surfaces and landing gear, and less in the production of the power-plant. There are ten sections in all, including one on Commercial Welding and Automotive Repairs. All papers deal with the use of arc welding in the various enterprises, and the book probably represents the greatest collection of practical information on that particular subject that has ever been put together.

We are informed that a new edition of Dr. W. Ker Wilson's book on the *Practical Solution of Torsional-Vibration Problems* is in preparation and will be issued shortly by the publishers, Chapman & Hall, Ltd., London. Since 1935, when the first edition appeared, there have been many changes in the field covered by the work, and these are said to be properly covered in the new edition, the value of which has been further enhanced by the addition of a considerable volume of new material. The chapter dealing with methods of measuring and recording torsional vibration frequencies and amplitudes has been rewritten, particular attention being given to apparatus suitable for use on high-speed engines. Dr. Wilson is design research engineer of the De Havilland Aircraft Co.

### Excise Tax Collections

Outstanding gains were made in excise tax collections on sales of automotive products, oil and gas in May 1939 as compared with May 1938, details of which follow:

	1939	May	1938
Automobile trucks .....	\$ 627,863.03	\$	350,697.92
Automobiles and motor cycles..	6,367,382.22		1,396,702.88
Auto. parts and accessories ...	711,722.33		375,217.05
Tires .....	1,993,221.71		1,496,270.56
Inner tubes ....	436,704.52		342,022.01
Lubricating oils. .	2,551,011.85		2,365,109.46
Gasoline .....	16,376,983.37		14,380,266.47

### 40 YEARS AGO

An ordinance requiring fenders on all motor vehicles is to be introduced in the Chicago Board of Aldermen, and a loud protest has been raised by the local manufacturers on the ground that the fenders would prove a disfigurement.

There is no need of fenders on light pleasure carriages, but they will probably be required on motor omnibuses, that is, on heavy vehicles making relatively high speed. A weight and speed limit would then determine the necessity of fenders.—From *The Horseless Age*, July, 1899.

Automotive Industries

## Argentina Concludes Negotiations On Plan to Finance Vehicle Imports

**Arrangement Permits Importers to Subscribe For a Maximum of \$8,631,000 in Treasury Notes**

A plan providing for the creation of dollar exchange to finance the importation of American Automobiles until the end of November, 1939, successfully concluding negotiations with importers for financing additional auto-

mobile imports into Argentina, has been reported to the Commerce Department by its office in Buenos Aires.

Officially announced by the Argentine Ministry of Finance, the plan will per-  
(Turn to page 45, please)



**ACCURATE**  
*springs*

**WHEN** you choose Accurate Springs you get all the advantages that an up-to-the-minute plant—hi-speed automatic equipment—and fast, economical production can give you.

Accurate has complete facilities for heat treating, finishing, testing, all to your specifications. All types of coil and flat springs, wire forms and small stampings are made by Accurate from all kinds of materials.

Send your specifications—or if you have a special problem an Accurate Engineer will help you solve it without obligation.

**ACCURATE SPRING MFG. CO.**  
3811 W. Lake St. Chicago, Ill.

July 1, 1939



## Michigan's New Labor Act Ruled Operative

### *Production Tie-Ups Held Remote if State's Law Does Not Conflict with the Wagner Act*

Michigan's new Labor Relations Act, passed recently by the State Legislature and signed by Governor Dickinson, has been ruled operative immediately by Thomas Read, state attorney-general; and if Read's opinion that the law does not conflict with the national Wagner

Labor Relations Act is upheld, prospects of damaging production tie-ups at the beginning of the 1940 model season will be somewhat more remote.

The new law's most important feature calls for a "cooling-off" period which is provided through requirement

of a five-day advance notice of an intent to strike during which period the dispute must be submitted for mediation to the newly created state labor relations board, a three-man agency whose appointment is subject to ratification by the State Senate although it has been ruled a defacto agency with mediation powers until such time as the Senate refuses to affirm appointments or terms of its members expire.

The Michigan attorney general indicated that the crux of the relationship between the Federal and Michigan labor laws lay in the provision in the state law requiring that notices of disputes must be filed with the state board and that a five-day attempt to mediate a dispute must be made before a strike or lockout is called.

"These provisions will probably raise the crucial question," Read said, "for the National Labor Relations Act say nothing in it shall be construed to interfere with or impede or diminish in any way the right to strike. This is a rule of construction, however, which we feel does not operate to restrict or impair the exercise of state police power.

"The sections of the Michigan act are a reasonable exercise of the police power, not destructive of constitutional or natural rights. They are designed to regulate, rather than to prohibit, the right to strike. They merely provide a reasonable 'cooling-off time' within which mediation may effect settlement and adjustment of a pending labor dispute."

### **May Rim Inspections Top 1938 by 76%**

Rims inspected and approved during May by the Tire & Rim Association totaled 1,243,519, an increase of approximately 76 per cent over May, 1938.

## LETTERS

*Editor, AUTOMOTIVE INDUSTRIES:*

A few days ago a blast came out in an evening newspaper quoting the writer as condemning all speed spectacles, stating that all race drivers were crazy and that my 14 years of racing were 14 years of hell, etc.

To say I was mis-quoted would be putting it mildly. I thoroughly enjoyed my racing career, was fairly successful in every respect and sincerely believe my Auto Repair Shop's prosperity is due in some degree to the prestige enjoyed by every race driver who is lucky enough to become what is popularly known as a "Top Flight Driver." While I do not recommend the race track as a short cut to "fame and fortune" (though it has been so used several times) I certainly do not condemn it.

C. R. WOODBURY.

## DIRECTION FOR THOSE "AT SEA"

Mariners at sea are directed safely to port by the never-failing guide of coast lights.

Chilton publications are the guiding light of automotive manufacturers "at sea" in their advertising plans.

Past the rocks of waste and extravagance, up the channels of precision and economy, the directed editorial effort of Chilton magazines bears them straight to the ports of profit.

Automobile Trade Journal, for car dealers only; Motor Age, for independent service stations only; Motor World Wholesale, for jobbers only; Commercial Car Journal, for fleet owners only; Automotive Industries, for executive and purchasing personnel of automotive industrial manufacturing plants.



## CHILTON PUBLICATIONS

Chestnut and 56th Streets, PHILADELPHIA, PA.

# Expenditure of \$14,250,000 for Educational Orders Starts July 1

## Six Firms Have Thus Far Received Awards from the War Department

The War Department will spend \$14,250,000 during the fiscal year beginning July 1 for placing educational orders with firms to familiarize them with the manufacture of non-commercial items of technical design necessary for wartime requirements if Congress approves the supplemental military appropriation bill which has been reported favorably by the House Appropriations Committee.

Congress approved the broadened educational program last April when it authorized an expenditure of \$42,500,000 to be available during the fiscal years 1939, 1940 and 1941 and \$2,000,000 during each of the next succeeding four fiscal years. The War Department had \$2,000,000 on hand during the current fiscal year for placing orders but exhausted this amount by awarding contracts to six companies.

The six firms, which were the first and the only ones thus far to receive awards under the program, the items ordered and the amounts involved follow:

The Goodyear Tire & Rubber Co., Akron, gas masks, \$192,000; Winchester Repeating Arms Co., New Haven, Conn., new semi-automatic rifles, \$1,384,500; General Electric Co., Schenectady, searchlight for anti-aircraft artillery, \$205,400; R. Hes & Co., New York, recoil mechanism for anti-aircraft gun, \$110,981; S. A. Woods Machine Co., Boston, machining 75 mm. shell, \$83,770; American Forge Co., Chicago, forging 75 mm. shell, \$20,250.

## Argentina Negotiations

(Continued from page 43)

mit importers to subscribe for a maximum of \$8,631,000 in Argentine treasury notes bearing 2½ per cent interest and payable over a period of three years in installments of 25, 25 and 50 per cent. This total, equivalent to approximately 35 per cent of the value of American automobiles imported into Argentina during the so-called commercial year of 1938 (Dec. 1, 1937, to Nov. 30, 1938), which together with the previously authorized allotment, will represent an aggregate quota of roughly 70 per cent of imports for the base period, the department reported.

It was explained that this period, instead of the calendar year, was used as a basis because the Argentine government considered that imports brought in during December, 1932, reached an abnormally high volume.

At the end of March, 1939, it was estimated that more than \$7,000,000 worth of American automobiles, chassis, and trucks had entered Argentina

since December, and that as a result there remained available less than \$2,000,000 in dollar exchange to be distributed among importers for the payment of imports of automobiles arriving in the country before the first of

December. Because of this situation, importers in Argentina faced the possibility of a temporary embargo on American automobiles and efforts to find a solution to the problem culminated in the present plan, the announcement said.

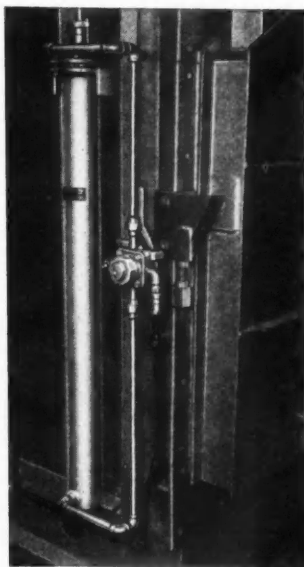
The report emphasized, however, that all parties to the financing plan have undertaken to retain possession of the treasury notes, reserving the right to discount them only in a case of emergency, or to pledge them as collateral only after consultation with the Economic and Commercial Counsellor to the Argentine Embassy at Washington.

## Another job done better with Curtis Air Cylinders

**Curtiss-Wright Corporation uses Curtis Air Cylinders at Buffalo and St. Louis Plants**

The simplicity and dependability of Curtis Air Cylinders makes them ideal for many lift, push or pull operations (as in this Curtiss-Wright installation), since interruption of production schedules to make repairs must be minimized. Under such conditions, Curtis Air Cylinders give unfailing service because of their rugged construction and simple design (only one moving part).

The installation cost of Curtis Air Cylinders or Hoists is small, and power consumption low, using regular shop air lines. Accurate control is assured, and there is no risk of injury from overload or bad atmospheric conditions. Because of their ef-



Operating oven-door at Buffalo Plant

ficiency, negligible maintenance expense and long life, important savings are almost inevitable wherever they can be used.

Check your plant to see where Curtis Air Power Cylinders can be applied to increase efficiency. Our new 28-page booklet, "How Air is Being Used in Your Industry" will give you helpful suggestions. Just send in the coupon—no obligation.

**CURTIS** Compressors • Air & Hydraulic Cylinders  
Air Hoists • I-Beam Cranes & Trolleys

CURTIS PNEUMATIC MACHINERY COMPANY  
1917 Kienlen Avenue, St. Louis, Missouri.  
Gentlemen: Please send me the new 28-page booklet,  
"How Air is Being Used in Your Industry."

Name \_\_\_\_\_ Street \_\_\_\_\_  
Firm \_\_\_\_\_ State \_\_\_\_\_  
City \_\_\_\_\_

## Russia Steps Up

(Continued from page 2)

engine of 76 hp. which is on a par with the best European and American cars of the same type. The Stalin Auto Plant has prepared a new model for production, the ZIS-102.

Soviet industry is doing considerable work in developing and manufacturing automobiles equipped with gas generators which operate on wood chocks or charcoal. These automobiles are of great value in regions remote from the oil fields which abound in timber, such

as the northern regions of the Soviet Union and Siberia. The designing of these automobiles was carried out by the Scientific Institute of Automotive and Tractor Industries, and they are being produced in growing numbers.

The high quality of Soviet automobiles with gas generators was demonstrated last October when 17 vehicles covered successfully a test run of 6200 miles. Notwithstanding the fact that the route lay along hard roads across the Ural Mountains and the forest regions of the North all the cars came through without any breakdown or mishap.

This trial run showed that 1½-ton

trucks consumed about 177 lb. of wood chocks per 100 miles while 3-ton trucks used about 280 lb. Trucks working on charcoal gas generators consumed about 105 lb. of charcoal per 100 miles.

The great expansion in automobile production resulted in a big rise in the number of auto vehicles in the Soviet Union. While in 1931 the Soviet Union held only 17th place in Europe, last year it forged ahead to fourth place for the number of automobiles. The USSR has by far outstripped all other countries for the rate of increase in the number of automobiles as is shown by the following table:

*Increase in the Number of Automobiles by Countries*

1938 as compared with 1931 (in %)

	1931		1938	
	%	Place in Europe	%	Place in Europe
Britain	100	1	148	1
France	100	2	153	2
Germany	100	3	220	3
Italy	100	4	150	5
Poland	100	15	100	18
USSR	100	17	2000	4

Notwithstanding the considerable expansion of the Soviet automotive industry in recent years it still is unable to cover the demand of the rapidly growing country.

The Third Five-Year Plan provides for considerable increase in automobile production. During the Third Five-Year Plan period the output of trucks is to rise 2.5 times as compared with that of the Second Five-Year Plan, and the output of passenger cars, four times.

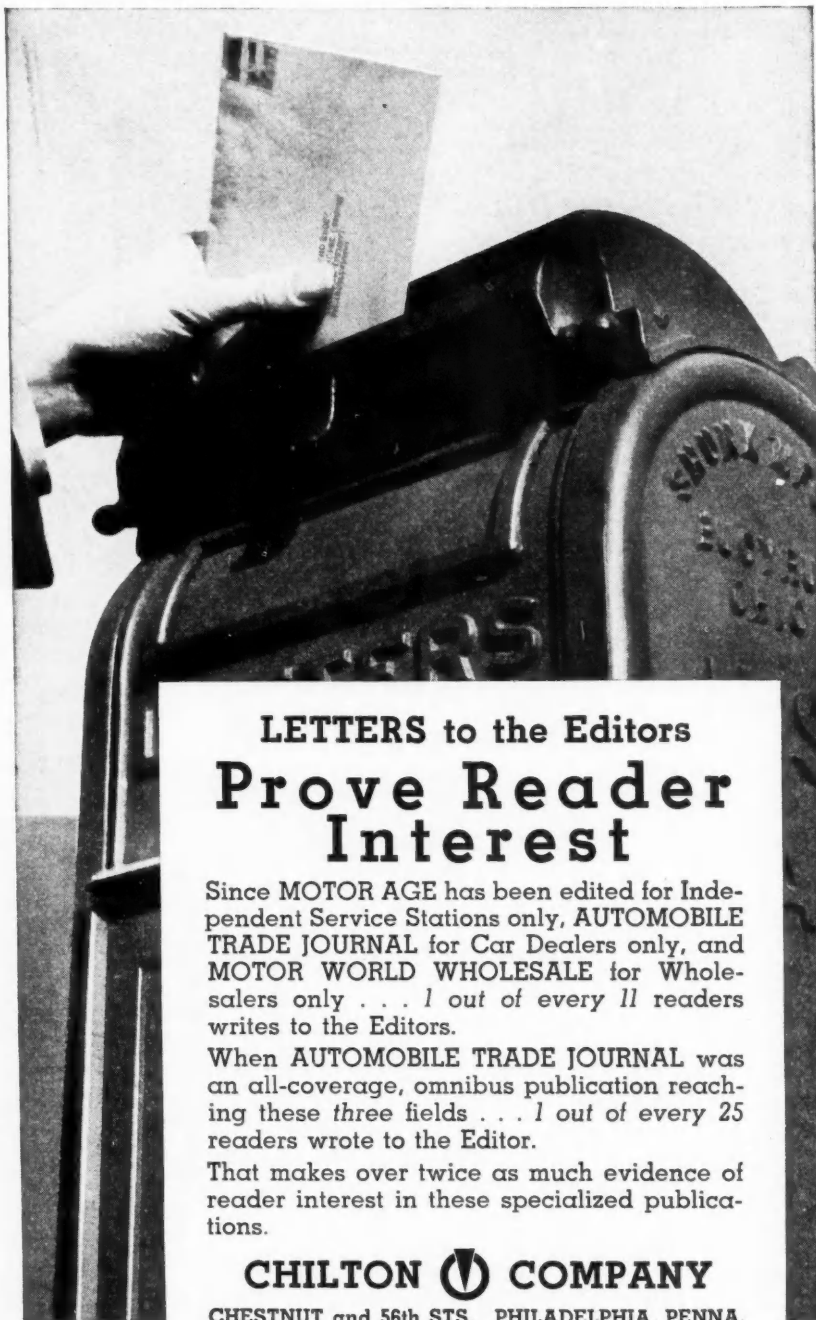
Further extension of the Moscow and Gorky auto plants is now in progress. After reconstruction the Gorky Plant will turn out 1700 vehicles daily and the Stalin Plant, 430 automobiles as compared with the present combined output of 800 vehicles.

In addition to the existing plants a large plant for the production of cars is now nearing completion; the new plant is designed for the production of 150 cars daily. The low-power car equipped with a 4-cylinder engine with 73 cu. in. displacement is capable of developing a speed of about 55-60 m.p.h. The car will be a four-seater with a phaeton or closed body suitable for postal or medical service and private use.

The rapid spread of the automobile throughout the Soviet Union brought forth the problem of extensive road construction. In 1931 the country had practically no hard pavement roads (435 miles in all). During the last seven years nearly 56,000 miles of hard pavement roads have been built and the other roads made suitable for auto traffic.

Of the larger road building jobs mention should be made of the Sochi-Matsesta, Moscow-Kiev and Moscow-Minsk highways with a total of 2000 miles.

The Third Five-Year Plan provides for the building and reconstruction of 130,000 miles of roads.




**LETTERS to the Editors**

**Prove Reader Interest**

Since MOTOR AGE has been edited for Independent Service Stations only, AUTOMOBILE TRADE JOURNAL for Car Dealers only, and MOTOR WORLD WHOLESALE for Wholesalers only . . . 1 out of every 11 readers writes to the Editors.

When AUTOMOBILE TRADE JOURNAL was an all-coverage, omnibus publication reaching these three fields . . . 1 out of every 25 readers wrote to the Editor.

That makes over twice as much evidence of reader interest in these specialized publications.

**CHILTON  COMPANY**

CHESTNUT and 56th STS. PHILADELPHIA, PENNA.



# MEN and MACHINES

(Continued from page 18)

screw mounted beneath the table. A solenoid operated reduction gearing provides a fine feed for facing or heavy boring, and also, by means of a pneumatic time relay for each direction of feed, permits facing to a positive stop. Feeding range is 16 in. in either direction. Feeds range from 1½ to 15 in. per minute with the facing feed normally 20 per cent of feed being used.

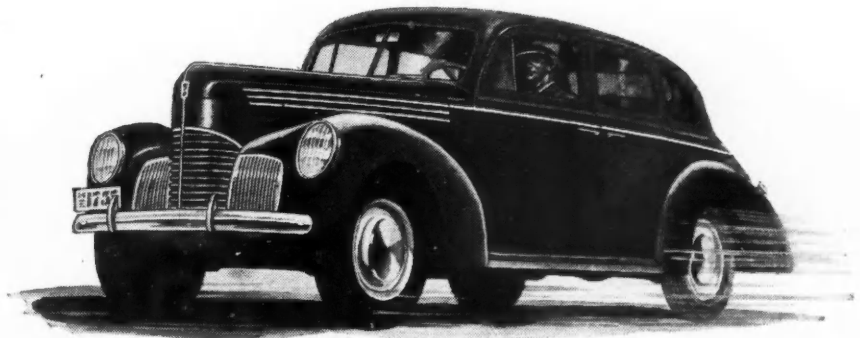
The "Easy" electric sander, a portable all-electric reciprocating motion sanding, rubbing and polishing machine is the latest product of the Detroit Surfacing Machine Co., Detroit. It is said to be adaptable to a wide range of new and refinishing applications on flat, curved and irregular surfaces—sanding, rubbing or polishing, from the finest precision work to roughest castings.

Balance, light weight of 6¼ lb., comfortable grip, convenient switch control, smooth reciprocating motion are said to insure easy, one-hand op-

experienced when abrasive paper is loose on the pad.

The Foote-Burt Co., Cleveland, recently placed on the market a new automatic single spindle screw machine designated as model No. 1½. This machine has a normal capacity of 1½ in., but by the use of a solid chuck and shell it will take 1¾ in., and is said to be efficient down to ½ in. due to the wide range of speeds. It will machine pieces up to 14 in. long.

A new feature of the spindle is the fact it is equipped with a chucking device consisting of a roller arrangement working under spring compression which eliminates the usual fingers and is more positive. Drive to the spindle is by a train of change gears to provide efficient spindle speeds on both steel and brass for all sizes within the range of the machine. Automatic speed changes, including two forward and two reverse speeds, are accomplished by means of a disk plate having adjustable trip dogs controlling the operation of hydraulic cylinders for operating multiple disk clutches, providing changes from high to low speed, or to



## Studebaker SOLVES 3 MORE PROBLEMS WITH DUPONT NEOPRENE

### PROBLEM No. 1

A steering tie rod seal which would retain the grease necessary for easy steering, and which would keep its efficiency throughout the life of the car.



**SOLUTION:** A seal of Du Pont neoprene. Neoprene's resilience permits a tight seal against the metal, and its resistance to deterioration by grease and oil assures permanence.

### PROBLEM No. 2

A vibration-absorbing connector for the oil pressure gauge pipe which would not be destroyed by engine vibration and contact with oil and heat.



**SOLUTION:** A length of hose of Du Pont neoprene. Neoprene has the strength and elasticity of rubber, yet it resists the effects of oils, grease, and engine heat.

### PROBLEM No. 3

A flexible brake fluid conduit which would not be affected by the brake fluid used.



**SOLUTION:** A hose made of Du Pont neoprene. Neoprene has the needed flexibility and elasticity, and its resistance to the effects of the Studebaker brake fluid and grease is assurance that it will not swell excessively and obstruct the flow.

**EVERY YEAR,** Du Pont neoprene is helping make resilient automotive parts more dependable, longer-lasting... just as it has helped perfect the mechanical performance of the beautiful new Studebaker. There are more than fifty neoprene parts on 1939 cars, and more are constantly being planned by engineers who know that better parts make better cars.

This remarkable material has the strength, elasticity and toughness of rubber—yet it is far more resistant to oils,

grease, gasoline, engine heat, ozone, battery acids, and aging. For helpful information about neoprene—and for your free copy of the interesting, illustrated Neoprene Handbook—write Du Pont, Rubber Chemicals Div., Wilmington, Del.

Make that part better with

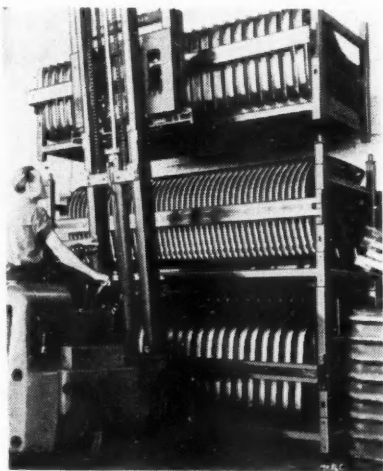


**NEOPRENE**

CHLOROPRENE RUBBER MADE BY DU PONT

Consult your rubber supplier, or write us

July 1, 1939



Sectionalized work carriers built by Mechanical Handling Systems, Inc. Note dowel plugs in each carrier upright which facilitate stacking of carriers.

eration on horizontal or vertical surfaces.

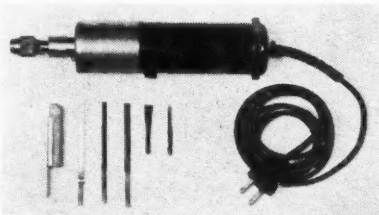
Power is furnished by a Universal motor which operates on A.C. or D.C. Ball bearing construction is employed throughout and every moving part runs in grease-packed and grease-sealed precision selected ball bearings. Ball bearing thrust with inner and outer races press-locked in place eliminates drive shaft shock in all directions. Forced ventilation cooling is provided by a fan mounted on the motor shaft. A filter installed in the motor cap removes injurious grit and debris from the air before it enters the motor.

A new improved type of abrasive holder has been developed for this machine which holds the abrasive paper tightly on the sanding pad, thus eliminating loss of cutting action commonly

reverse, at any turret hole, or at any point in the feed. It is possible to reverse the spindle at low speed and immediately trip to high reverse speed, allowing the use of a simple tap holder.

The turret is provided with six holes and is indexed by Geneva motion which is efficient in its operation as a complete cycle is made in eight seconds. The feed is accomplished by means of a drum-type cam having a solid path, which cam is driven hydraulically. A control panel is furnished having six micrometer-type knobs for controlling hydraulic valves, one for each hole of the turret.

Setting up of the machine is very



**H & H Research Co.'s multi-purpose tool with reciprocating head for chipping, burring, honing, etc.**

simple due to the fact that levers for controlling the machine are arranged both in the front and the rear; the feed



## When Service Fits the Purse...

Low cost of replaceable parts and service has placed the automobile within the means of practically everyone. Schrader-type tire valves clearly reflect the advantages of standardized replaceable parts. Schrader Cores and Caps cost but a small fraction of a complete new valve. They can be installed anywhere by anyone, without special tools and without removing tire, tube or wheel. This convenient service, costing only a dime, is an important factor in the mass distribution of automobiles and pneumatic tires.

A. SCHRADER'S SON, BROOKLYN, N. Y.  
Division of Scovill Manufacturing Company, Inc.

# Schrader

REG. U.S. PAT. OFF.

## TIRE VALVES

THE STANDARD FOR EQUIPMENT AND REPLACEMENT



### TRADE ADVANTAGES

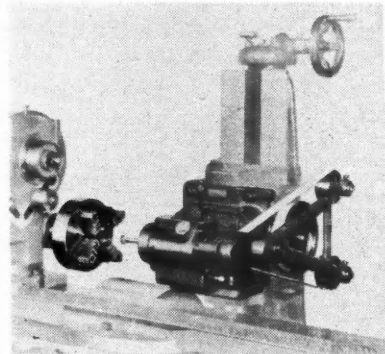
The interchangeability of Schrader Tire Valve parts reduces delays in tire and vehicle servicing and simplifies the inventory problem for the entire trade.

may be stopped at any point in the cycle and indexing may be done at either fast or slow speed in setting the machine.

Brown & Sharpe Mfg. Co., Providence, R. I., has produced a new internal grinding attachment for its No. 13 universal and tool grinding machine. The tapered cartridge-type spindle unit is carried in a casting mounted on a knee secured to the front of the wheel slide of the machine. The spindle, driven from the machine spindle by a canvass belt, runs at 27,000 r.p.m. and is supported by two double-row self-aligning ball bearings. Oil is filtered before it reaches the bearings, and after it has passed, it is caught in a tray which can be removed and emptied. Wheel arbors are interchangeable and each is seated by a taper and held in the spindle by its threaded end.

Capacity ranges from holes with a minimum diameter of  $\frac{1}{4}$  in. and maximum length of 1 in. to holes with a minimum diameter of  $\frac{7}{16}$  in. and maximum length of 2 in. A 4-jawed chuck, with jaws independent and reversible, is furnished with the attachment. Brown & Sharpe has also brought out the No. OA change gear guard for drive to universal spiral index carriers. It is similar to the company's Nos. O, 2 and 3 guards and is intended for use on the No. 0 Omniversal milling machine.

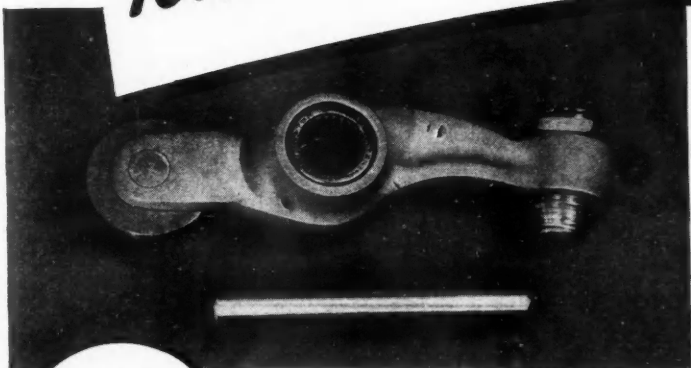
A device for the measurement and layout of angles called the "angle micrometer" has been developed by Frank Tyson, Canton, Ohio. According to the



**Brown & Sharpe Mfg. Co. internal grinding attachment. (Ball bearing type).**

inventor, the basic principle of the device is the actual measurement of angles by micrometer rather than the customary expedient of dividing the angle mechanically. Essentially, the device comprises a quadrant having a developed length of 36 in., so that a displacement of 0.1 in. defines an angle of one degree. Measurement is accomplished by means of accurately milled worm gearing. To read in minutes, the operator turns a loosely mounted worm wheel having 60 teeth which in one revolution advances the main work by one-sixtieth of  $\frac{1}{10}$  in., or  $\frac{1}{600}$  in., the value of one minute. To measure accurately to seconds of a degree, the operator turns the graduated wheel at

# 705,000,000 POUNDS OF IMPACT!



Above—Photo of the Torrington Needle Bearing in a rocker arm from the test engine of the Ranger Engineering Corp., Farmingdale, N. Y. Note the perfect appearance of the bearing and shaft which served directly as the inner race.

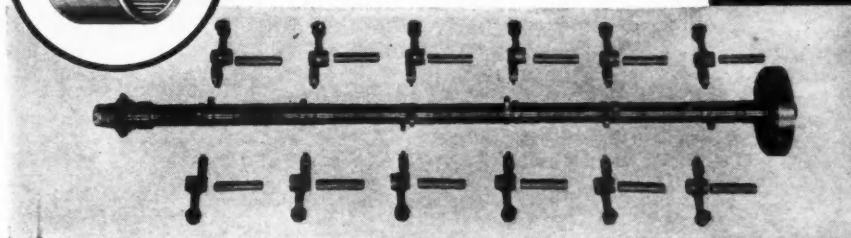
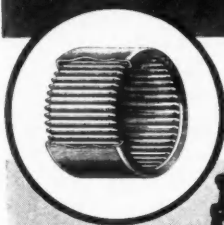
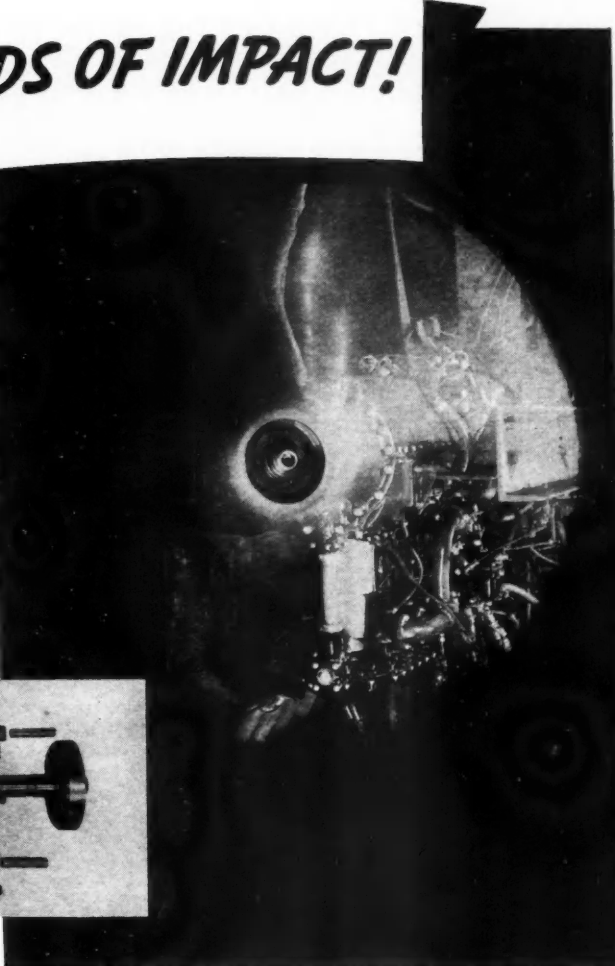


Photo above shows the camshaft and twelve rocker arms after disassembly. The camshaft rotated at 1,225 R.P.M., half engine speed.



One of the most grueling tests ever put upon an Aircraft Engine.

## 50-Hour, Full-throttle, Non-stop Test in Ranger Aircraft Engine Proves Torrington Needle Bearings can take it.

IMAGINE a cumulative load of 705,000,000 pounds impact in a 50-hour period—produced by 3,525,000 separate oscillations. Each oscillation imposed an impact load of 200 pounds on each of the Torrington Needle Bearings in the valve rocker arms of the Ranger Model 6-410 six-cylinder engine during a fifty-hour, full-throttle test—one of the most grueling tests which can be imposed on an aircraft engine, a test calculated to wreck any part not perfectly engineered to its job.

The acceleration on the bearing race was at the rate of 656 feet per second per second—an acceleration equivalent to a speed increase of 0 to 447 miles per hour in one second.

The rocker arm bearings showed no sign of wear when inspected at the end of the test. This means that rebushing on every overhaul, always a costly maintenance job in aircraft operation, will be eliminated.

But even more important are other

characteristic advantages of the Torrington Needle Bearing which make it the ideal bearing for many aircraft, automotive and industrial applications. Its high radial load capacity, its small, compact size which requires no more space than a simple bushing, the extremely simplified housing required, the resulting weight reductions, all contribute to better design, greater operating efficiency and production economies.

The Torrington Needle Bearing is also surprisingly low in unit cost compared to any other type of anti-friction bearing.

Let our engineering department give

you a demonstration of these advantages put to work in your own product so you can estimate your own increased efficiency and cost savings. We will be glad to work with you in adapting the Needle Bearing to your product requirements. Write for the Torrington Needle Bearing Catalog No. 7.

For Needle Bearings to be used in heavier service, request Booklet 103X from our associate, the Bantam Bearings Corporation at South Bend, Indiana.

*The Torrington Company*  
ESTABLISHED 1866  
*Torrington, Conn., U.S.A.*

Makers of Ball and Needle Bearings

Branch Offices in all Principal Cities

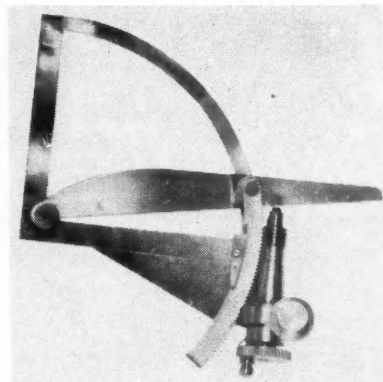
# TORRINGTON NEEDLE BEARING



the right, which is divided into 60 divisions, so that each single division represents one-sixtieth of a minute. According to the inventor, the resulting angle will check precisely with gage blocks.

A new tool developed by H & H Research Co., 1925 Buena Vista, Detroit, Mich., has a reciprocating movement to be used for taking off the last thousandths in special machine production, in die sinking, in pattern, tool and plastic mold making—work that has always been done by hand. Powered with a 110-volt universal motor, it chips, saws, files, burrs, hones, developing a six- to sixteen-pound push, depending upon the

tool model at the end of the file. Known as the "Hoover Multi-Purpose Tool," it has a maximum diameter of 1 3/8 in., is 8 in. long, weighs one pound and the chuck has a 3/8-in. capacity, round or square. Sectionalized work carriers built of arc-welded square steel tubing for light weight, yet sufficiently strong to handle loads up to 3000 lb., are being manufactured by Mechanical Handling Systems, Inc., Detroit. The basic unit consists of a 3 ft. 3 in. by 9 ft. frame with an end frame from 2 ft. 8 in. at one end. The other end of the base has a short upright at each corner, each post being open at the ends so that a removable end frame, similar to



"Angle Micrometer" invented by Frank Tyson.



# SERVES BEST

## Where Experience Counts

### EFFICIENT SERVICE TO AUTOMOTIVE INDUSTRY FOR 36 YEARS

● **Spicer** service is built upon 36 years' experience in meeting the demands of leading manufacturers of passenger cars, trucks, buses and tractors for power transmission equipment. That's why you're ahead when you specify **Spicer**.

There's nothing like experience when it comes to knowing the requirements of the industry—in developing universal joints, propeller shafts, transmissions, clutches, power take-offs and frames of the most modern, efficient and economical designs—in building for long and satisfactory operation. That's where **Spicer** experience counts—that's where **Spicer** service excels.

For complete and reliable original equipment or replacement parts service, let the experience of the leading car, truck, bus and tractor builders and the experience of **Spicer** be your guide . . . Wherever industry must be efficiently served—experience specifies **Spicer**.

## Spicer Manufacturing Corporation

### Toledo • Ohio

**BROWN-LIPE**  
CLUTCHES and  
TRANSMISSIONS

**SALISBURY**  
FRONT and REAR  
AXLES

**SPICER**  
UNIVERSAL  
JOINTS

**PARISH**  
FRAMES  
READING, PA.

the permanent one, can be slipped in to form a symmetrical carrier. With both ends of each end post being open, it is a simple matter to insert an end frame of any required height, against which may be stacked unusually long parts. Removable casters can be slipped in at the under end of each upright to create a mobile unit which can be pushed around the shop by hand or hauled in "trains" by a factory truck.

Progressive Welder Co., Detroit, has brought out a lightweight "pincher" type welding gun which is hydraulic in operation and designed for welding currents up to 50 kva, and welding pressures up to 100 lb. The new gun is built almost entirely of magnesium.

An outstanding feature of the new gun is the use of the sliding contact principle of current transmission. Current is transmitted to electrodes directly through the pressure cylinder and piston, the latter being built into the gun.—H. E. B., JR.

#### Publications Available on Machine Tools

Book No. 1600 prepared by the Link-Belt Co., Chicago, gives comprehensive data on the company's line of **power transmission equipment**.\*

An illustrated folder issued by the Leeds & Northrup Co., Philadelphia, describes uses for the company's Rayotube, a **temperature detector** which can sight on work in motion.\*

Twist drills, reamers, punches and special tools supplied by Whitman & Barnes Division of United Drill and Tool Corp. are described in catalog No. 96.\*

Bulletin 352 of the Hauck Manufacturing Co. describes its **rivet heating forges**.\*

A bulletin covering a new line of **face shields** has been published by the Davis Emergency Equipment Co.\*

Bulletin 139 issued by Lake Erie Engineering Corp., Buffalo, N. Y., describes the company's line of "**Streamlined Hydraulic Presses**".\*

"How to Write a Traveling Crane Specification" is the title of a booklet published by the Whiting Corp., Harvey, Ill.\*

\* Obtainable from editorial department, AUTOMOTIVE INDUSTRIES, Address Chestnut and 56th Sts., Philadelphia.